Food Manufacture

Incorporating Canning, Packing, and Preserving

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The Panicky Press.

WE DO not wish to pick a quarrel with the daily press, nevertheless we find it impossible to restrain from registering disapproval of the particularly obnoxious practice, amounting almost to a habit, that many papers have of swooping down on any exceptional cases of poisoning or adulteration recorded in analytical reports, dragging them out of their context, and searemongering them into flaming, hysterical headlines for the edification of a public only too ready to gloat over rank sensationalism.

It might well be submitted that this deplorable practice amounts to deliberate misrepresentation for the sake of stunty news, if news it can be called. Why should the food industry, to the exclusion of all others, be singled out and dragged in the mud—disgraced in the eyes of the public? Let these glib headline writers turn their attention to "the car that is guaranteed to do 75 m.p.h.," or "the brakes which will pull one up from 30 m.p.h. in three yards," or the "real leather," "solid oak" furniture, and see what will happen!

We challenge the press to cite, on impartial investigation, any industry which turns out cleaner, purer products that are offered to the public with less misrepresentation or overstatement than does the food industry.

An Instance.

A recent instance of this abuse of published analytical data is worth citing. The headlines run "Poisons Found in Foods," "Arsenic in Beer and Sweets," "Analyst's Reports," "Salt and Sand Mixed with Sugar." Such are calculated, at least, to arrest attention and fire the imagination, leaving a nasty impression despite the scrap of information one reads below. "The number of samples of foods and drugs submitted to public analysts in the year 1931 was 136,169. Samples numbering 6,324 were reported as adulterated or not up to standard, being 4·6 per cent. of the number examined. This was the lowest percentage recorded" (the Ministry of Health's Annual Report). Surely there is no justification in this for yapping headlines!

Editorial "Puffs."

The food industry should make a firm stand against this unfair practice of the national press. Other bodies have forced matters over to the opposite extreme in that they actually look for editorial "puffs" in return for their advertising. This, of course, is an equally pernicious practice, and it is time that such bodies were brought to another opinion. In this connection it is interesting to note that all Manchester theatres, with the exception of the variety houses, have withdrawn their advertising from the *Daily Express* Northern edition on account of their dissatisfaction with an "unfair" criticism. In reply, the *Daily Express* indicated that they did not accept the implied suggestion that they must write favourably—which, in our opinion, is a very praiseworthy attitude to take up.

Onion Peeling.

It is reported that a pickle manufacturer in Australia is peeling onions by subjecting them to a fierce gas flame for three seconds as they roll down an incline, thereby burning off the skins.

Canned Vegetables in Brazil.

Of the canned vegetables the only ones which enjoy any appreciable demand in Brazil are peas and tomatoes. The others are essentially luxury items. French canned peas dominate the import trade. During the past few years new brands of locally canned peas of improved quality have appeared on the market, and some of these are practically as good as the French product. Brazilian canned peaches are reported to be excellent, the only drawback being a certain toughness of the fruit.

Glass Containers.

There are signs that the glass people are waking up to the realisation that if they do not collectively assert themselves in the interests of the glass container as opposed to the tin container for certain food packs, they stand in danger of losing ground.

In America, as readers know, the glass container is taken care of by its own special association, and they have been sufficiently active to turn the tide in favour of an increased regard on the part of the public for glass-packed goods.

Even in West Australia, where jams were formerly put up in tins, the glass container is making headway, and shops are displaying jams packed in glass which are greatly admired by customers.

Oysters Relax.

"Tight as an oyster" will become an obsolete saying if the new methods of opening oysters suggested by Koehring and Prytherck of the U.S. Bureau of Fisheries can be applied to practice.

In *Investigational Report No.* 15, published a few months ago, these biologists describe a number of tests they conducted on the muscular behaviour of oysters immersed in sea water to which carbon dioxide, hydrochloric acid, acetic acid, acetic-hydrochloric acids, lactic acid, boric acid, and formic acid had been added. The actions of these narcotising agents were investigated very thoroughly, and although there is still room for further work, the results obtained are of great importance to the oyster industry. Not only can the meats be easily and quickly removed from the shells with no tearing of the mantle or muscle, but bacterial growth is inhibited and the meats are in no way impaired.

In the case of hydrochloric acid, for example, the amount used gives a less concentration than prevails in the human stomach. The method is very cheap; 1,000 oysters require less than 5 cents' worth of HCl.

A New Style Smokehouse.

A Chicago packer recently perfected a continuous type of smokehouse for sausage. It is built as a smoking tunnel, 45 feet long, equipped with two overhead conveyor chains and rails. The sausage hangs on the usual type of sticks and cages, which are loaded into the smoke tunnel at one end and taken out at the opposite end.

The time required for smoking varies with the product. Frankfurters take 45 minutes; other types of sausage from 1 to 3 hours. The speed of the conveyor can be governed to suit the manufacturing requirements.

This smokehouse has a capacity of 5,000 lb. of Frankfurters per hour. It is equipped with automatic heat control and turns out a product which is bright in colour and evenly smoked. Cost of labour, heat, and smoke is said to be less than would be required by a battery of old style smokehouses.

Cleaning Casings.

Mr. R. E. Yocum, General Superintendent of the Cudahy Packing Company, gave those who attended the last Convention of the Institute of American Meat Packers a very clear exposition of just what is involved in the cleaning of casings. He also described a new and improved method that had been successfully worked out. A combination of mechanical, heat, and bacterial means enabled the slime coat to be removed in a much shorter time than with the old ripening method, and without its disagreeable odour. The new method also gave a much closer control of the cleaning process, thus doing away with over-ripening, which causes tenderness, and improving the yield.

Wines of Palestine.

In the expectation that Palestine wines will find a large market in the United States, if and when Prohibition is abolished, there is reported to be considerable activity in Palestine. It is stated that the Mikveh Israel Agricultural School has begun to cultivate parts of its farm lands as vineyards. Negotiations for export are already in progress.

Cheese Ripening.

Mr. C. D Kelly, of the New York State Agricultural Experiment Station, has been studying protein hydrolysis and the part played by the starter in the production of aroma and flavour in Cheddar cheese.

Although a steady breaking down of the proteins was demonstrated, this is far from complete when the cheese is ripe, which is contrary to the generally accepted view.

The second part of the investigation was chiefly concerned with *Streptococcus lactis* (Lister) Löhnis, an organism producing acid and little aroma, and *S. cremoris* Orla-Jensen, an acid and aroma producing organism. These are stated to be the two organisms most commonly used in Cheddar cheese making. From the recorded data it would seem that the production of acid is the important function of a cheese starter and that Cheddar cheese can be made with satisfactory results with cultures of either *S. lactis* or *S. cremoris*.

Aluminium and Foodstuffs.

A remarkably complete compendium of all that has been published of any consequence on the hygienic aspects of aluminium has been received from the Mellon Institute of Industrial Research, University of Pittsburg. This bulletin is the outcome of work initiated at the

Mellon Institute in 1926, having as its object the investigation of metals used in the construction of cooking utensils, industrial food-preparation equipment and containers, with special reference to the physiological action of aluminium and its alloys in relation to foodstuffs.

Many enquiries were received concerning the hygienic aspects of aluminium utensils during the progress of this work, and it was therefore decided to publish the results of the investigations in the form of a bulletin. We are glad that this decision was taken, for the bulletin will be welcomed with open arms by hundreds, probably thousands, of people who, like ourselves, have been at a loss to lay their hands on material sufficiently authentic and wide-embracing to enable the matter to be viewed in its true perspective. Now there is no difficulty. Condensed in its seventy pages are the results of hundreds of investigators and their points of view, all admirably arranged so that it is quite easy to get the comprehensive view.

Dr. George D. Beal, Assistant Director of the Mellon Institute, supervised these studies, and in a preface to the bulletin he shows that aluminium is not a poisonous metal and does not give rise to any disease. Furthermore, he demonstrates that aluminium utensils are very resistant to corrosion by foodstuffs cooked therein, and that aluminium does not accelerate the destruction of vitamins or other food accessory substances during cooking.

Dermatitis.

Bennion has recently given some details of an enquiry into the cause of bakers' eczema, which has been carried out in Germany. We have referred to this subject from time to time, but the cause seems rather obscure. The German researches indicate that bakers' dermatitis did not appear in Germany until the competition of America with fine white flour caused German millers to adopt flour-treating methods. The conclusion is that dermatitis is due very largely to the use of flour improvers generally and to ammonium persulphate in particular. The authors do not appear to produce any experimental evidence that this is the case, and doubtless other factors come into the question. The medical profession both in this country and abroad seem to be divided on the subject, but careful observation of industrial dermatitis does seem to indicate that there are individuals with a definite dermatitis idiosyncrasy, and they seem to get it at the slightest provocation, while others can withstand far worse conditions and yet be unaffected.

Bacteria on Fruit.

On account of the unavoidable handling of fruit between the grower and the consumer, and the widespread diffusion of micro-organisms, there is necessarily much contamination of the fruit. The vast majority of germs attached to the surface of fruit are harmless, but pathogenic organisms may be deposited at times. In a recent issue of the *British Medical Journal*, J. J. Smeal describes an exhaustive investigation of the subject. Apart both from any definite disease and from the diarrhœa and colic sometimes caused by the ingestion of unripe fruit, it seems likely that some of the minor gastro-intestinal disturbances common during the fruit-eating season may be due to the bacterial content of the fruit. The available evidence indicates that the germs present on the surface of the fruit do not penetrate the unbroken skin to the edible pulp, but it was found that the typhoid bacillus, emulsified in normal saline and placed on the surface of dates, remained alive after sixty-eight days' storage in the dark at the ordinary temperature. Pathogenic bacteria, protozoan cysts, and helminth eggs may be killed by immersion of the fruit in boiling water for 10 seconds, but such a drastic measure is scarcely necessary in this country to render fruit reasonably safe. If the skin of fruit is to be eaten, it is recommended that the fruit be washed either in running water or in several changes of water.

Flour Bleaching.

Flour is bleached chemically by a number of substances, one of which is benzoyl peroxide. The activity of this substance depends on a slow liberation of oxygen, and when the action is over there is a minute residue of benzoic acid. It is not so easy to detect whether flour has been bleached by this agent as it is in the case of nitrogen peroxide or chlorine, when residual nitrites or chlorine can readily be determined. Recently Nicholls (*Analyst*, January, 1933, p. 4) has worked out a method that appears to be satisfactory, not merely for the detection but also for the accurate determination of benzoyl peroxide in flour. The method—which depends on distilling the benzoic acid or benzoyl peroxide in steam from an acid calcium chloride, and subsequent conversion to salicylic acid, which is then determined colorimetrically—is fully described in the journal referred to. In some countries the chemical bleaching of flour is prohibited and the detection and determination of bleaching agents is most important. In this country bleaching is permitted, but the method referred to above is, nevertheless, very interesting and no doubt will receive due attention from cereal chemists.

Watery White of Egg.

One of the defects shown in candling eggs is the "watery white" of egg caused by the presence of loose air bubbles in the white, or by a tremulous or large air

space. It has been found possible to produce this condition in almost any normal fresh egg merely by shaking it. Experiments carried out in Northern Ireland have shown that the defect develops with much more certainty in cases where the eggs are packed for transport with the air space downwards. On account of the importance of this fact to all those concerned in the packing of eggs for transport, the Ministry of Agriculture has notified it to egg-packing stations. Eggs for transport should be packed with air cells upwards, and very well sprung vehicles should be employed, together with any device available to prevent vibration. It has been noticed that some eggs do not develop the condition, while others are very prone to it. Researches are now in progress, we understand, at Cambridge to investigate this interesting subject.

Spring Sowings.

In view of the Wheat Act and the benefits derivable therefrom it is extremely likely that some farmers will have a gamble on spring sown cereals in this country. It may come off, but the odds will be on a very poor crop. In case any speculative farmer is contemplating this step, the Institute of Agricultural Botany at Cambridge has issued a leaflet indicating the best varieties of cereals for spring sowing. English grown cereal seed gives just as good results as foreign, provided the standard of purity and germination is the same, but whichever variety is chosen early sowing always pays. In regard to wheat, the Institute recommends Little Joss up to the end of February, A1 or Red Marvel (Japhet) in March, and April Bearded for the latest sowings. These varieties are noted more for yield than quality, and even if a good crop is harvested as far as bushels to the acre go, the milling quality of the wheat is not likely to be good. Among the varieties of oats, recent trials have confirmed the merits of Golden Rain II. for use where the crop is to be fed on the farm. Victory and Star also yield well and have a very white colour. Marvellous gives heavy crops of rather coarse grain, but it should not be sown after the middle of February. Farmers would do well to study this leaflet, which also gives useful information regarding malting barleys. If agriculture is to become a more scientific and systematic industry all the scientific information available should be utilised.

Tomato Mildew.

Everyone who has tried to grow tomatoes on a commercial scale knows the havoc caused by mildew. In this humid climate it spreads rapidly and its effects are most destructive. Growers will, therefore, be interested to hear of the investigations of Mr. Holmes Smith of Manchester University on this subject. The conclusion arrived at is that the inception, spread, and control of this disease depend on ventilation. It is pointed out that too much is expected of the ordinary type of glasshouse such as is used by commercial growers for rotational crops of salads, vegetables, fruit, and flowers. Such houses may do well enough for sweet peas or early salads and yet be unsuitable for tomatoes, owing mainly to inefficient ventilation. Mr. Smith found that in the ordinary type of glasshouse the first victims of tomato mildew are those growing in pockets of still air that form in the spans and are not reached by the method of ventilation supplied. Small electric fans are suggested to keep the air moving. In the control of the disease and as a protection against infection, spraying with a solution of 1½oz. of salicylanilide paste and 2½ oz. of agral 1 in 10 gallons of water is recommended. The first spraying should be before the mildew usually shows itself in the late spring, and this should be followed by spraying at intervals. If the houses are really well ventilated, however, very little spraying is necessary.

South Africa.

A new canning factory is reported to have been opened at Bellville, near Cape Town. At first only apricots, pears, and peaches are to be dealt with. A working arrangement between canners and growers has been arrived at.

Vitaminised Bread and Milk.

It is reported that the National Oil Products Co., of New York, plans to sublicense bakeries and dairies which will add a vitamin D concentrate to bread and milk.

Butter.

A report has been issued by the Medical Research Council upon the vitamin content of butter. It states that butter from New Zealand and Australia is equal in its content of vitamins A and D to English summer butter. In other words both vitamins are unaffected by cold storage, and New Zealand and Australia offer us a source of summer butter in winter which should provide a supply of butter affording a richness in vitamins which belongs to our own summer supply.

Vitamin H?

R. Kuhn, P. György, and T. Wagner-Jauregg announce the isolation of a crystalline pigment from egg albumen, yeast, etc., which is active as a source of B_2 in rat tests in doses of 100 γ a day (*Ber. der Deutsche Chem. Ges.*, 1933, Vol. 66, p. 317). It would appear that these workers claim to have effected a separation of a new "Haut-Factors (Vitamin H)" from vitamin B_2.

The MANUFACTURE OF SAUCES

An Account of Current Practice

From a coloured poster by Keith Henderson issued by the Empire Marketing Board. Reproduced by permission of the Controller of H.M. Stationery Office.

ENGLAND BY tradition is the home of bottled sauces, both thick and fruity or thin and spicy. France may excel in the preparation of culinary sauces, and America leads the way with tomato sauces such as catsup and chilli sauce, but England by reason of applied skill and accumulated experience reigns supreme wherever bottled fruit sauces are in question.

Sauces which are household names in England are household names throughout the world. Undoubtedly England's position as the pioneer in the development of Oriental trade has contributed much to her present position in this field, as much of the characteristic piquancy of sauces is due to the blending of Oriental fruits and spices.

The manufacture of fruit sauces is an interesting example of scientific control applied to an art often handed down from generation to generation. The recipes for most well-known makes of sauces are carefully guarded secrets dating back a hundred years or more, but the actual manufacturing and bottling operations are carried out under scientific supervision. Problems connected with the proper selection and utilisation of raw materials and equipment are subjects of scientific investigation. It would, of course, be almost a labour of Hercules for a would-be sauce manufacturer to make a product imitating one of the standard brands now on the market, but with a knowledge of the available raw materials and of the processes involved, and with the aid of careful experimentation, it is possible to produce palatable sauces which can be profitably marketed.

Vinegar.

Vinegar is, of course, the most important raw material. A good quality well-matured malt vinegar is almost essential in the manufacture of fruit sauces. It is impossible to obtain the same flavour by the use of spirit vinegar; cider vinegar has a pleasant characteristic flavour, but appears to be rather mild when used in sauces.

It will not generally be profitable for the manufacturer of sauces to brew his own vinegar, although, of course, many sauce manufacturers are also vinegar brewers.

Vinegar should be selected for its aroma and flavour, and should have an acetic acid content of from 5·0 to 5·5 per cent. It is important to see that the acidity of the vinegar is maintained at a constant figure, otherwise variations in acidity of the prepared sauce will take place, which will not only produce variations in flavour, but may also lead to spoilage. Vinegar should be matured for at least one month, preferably three, before use in sauces.

The amount of vinegar used will depend to some extent on the other ingredients, and will be higher in proportion in thin spicy sauces than in thick fruity sauces. Vinegar comprises from 40 to 50 per cent. of most sauce recipes, but the amount should be regulated to produce an acidity of around 3 per cent. in fruit sauces and 3·5 per cent. in thin sauces, varying, of course, with the other ingredients, some of which will contribute to the total acidity by reason of their citric acid content.

Fruit.

In thick sauces the ingredient next in importance to the vinegar is the fruit. Many kinds of fruit are used in sauce. The *date* is one of the most popular. Mesopotamian dates packed solid in wooden boxes are generally used for sauce making, although dates destined for table use, but rejected on account of ragged appearance or blemishes, can be employed if economically available. Dried out or smutty dates should be avoided. Flavour is naturally of prime importance in selecting dates.

A Date Palm Plantation near Biskra.

Raisins are often used in conjunction with dates. African or Californian raisins may be used, depending on the supply available on the market. In general, grades lower than those sold for table or domestic use are purchased for manufacturing purposes, as the higher price paid for the appearance and size of the more expensive grades does not result in any improved flavour in the finished sauce.

Sultanas are not so desirable as raisins, as they do not have such a full flavour, and being lighter in colour do not impart the same rich fruity appearance to the finished sauce. Seeded raisins are to be preferred to the unseeded fruit.

Mango Dealers Bargaining in Dumb Show by Tapping the Auctioneer's Hand under Cover of a Cloth.

(With acknowledgments to the High Commissioner for India.)

Almost any variety of raisin may be used in sauce making; as the raisin is used for its flavour and fruitiness, and is chopped fine in making the sauce, the original appearance of the fruit is of secondary importance, provided, of course, it is free from insect infestation or other forms of spoilage. Valencias, Australian raisins, South

Some manufacturers also use *damsons*, *plums*, or the like, generally in the form of pulp, in order to impart a characteristic flavour to the sauce. The amount of fruit used will depend on the type of sauce required and on the price the finished article is expected to fetch. A high-class thick sauce will contain from 20 to 25 per

cent. of fruit, a large proportion of which will be dates or raisins. In thin sauces of the Worcestershire type the proportion of fruit will be considerably lower.

Most manufacturers of thick sauces use a proportion of *apples* or apple pulp, say from 5 to 10 per cent. of the final sauce, to give body to the product. The apples may be used fresh if available, or may be preserved cold in a sulphite solution as described in previous issues of Food Manufacture, or as chopped apple pulp boiled with a small amount of water and preserved in casks with a sulphite solution. "Body" or pectin content is more important than flavour in apples for sauce making.

Another fruit which is almost indispensable in the manufacture of good sauces is the *tamarind*. West Indian tamarinds, which are redder in colour than the East Indian variety, are generally employed. The tamarind possesses a somewhat acid and very refreshing taste. It is desirable to remove the tough fibres as far as possible by a preliminary soaking or boiling in vinegar before the actual cooking of the sauce. Up to 5 per cent. or more tamarinds may be used according to taste.

Mangoes are also found in high-class sauces, used either direct from brine or in the form of mango chutney. The amount of mango used should be small, as it has a penetrating characteristic flavour.

Tomatoes.

Tomato pulp or purée is another favourite ingredient. It should be selected on the bases of colour and flavour, although the specific gravity indicating the degree of concentration is important in comparing the price values of supplies from different sources. A good red-coloured tomato purée will give a fine coloured sauce. Italian tomato purée is usually deeper in colour and stronger in flavour than the French or American product, but it is advisable to purchase on sample, as, of course, the product of individual packers in any country will vary and the product of the country as a whole will vary from season to season according to growing conditions.

Picking Mangoes with Hooked Bamboos.
(With acknowledgments to the High Commissioner for India.)

Soy.

The most important ingredient in thin sauces is "Soy" sauce, which is largely used as a seasoning in China and Japan, and is manufactured over a widely distributed area in these countries. The process of manufacture consists essentially of the fermentation of a mixture of cooked soy beans and crushed roasted wheat followed by curing in brine. The fermentation is brought about by a species of mould, which in a few days, depending on temperature and moisture conditions, will bring about the desired changes in the mixture of beans and wheat, the mass being then dumped into brine and matured for six months or more, when the thick dark-coloured liquid is drawn off and filtered. Soy has a pungent agreeable flavour suggestive of liquorice. It has a high specific gravity, and this, together with ash content and flavour, may serve as a guide to the purity of the material. However, soy is produced by a large number of different methods and recipes, and as the flavour of one brand is

liable to be quite different from that of another, the best procedure is to select one particular brand or source of supply and use this exclusively, watching shipments carefully for variations in flavour.

Other Materials.

Another material imparting a characteristic flavour is the *anchovy*. The Gorgona anchovy has the finest flavour, but the African anchovy is generally found in sauces. Anchovies are normally packed in small casks with salt, and need to be continually rebrined in order to keep in good condition; they should be stored in as cool a place as possible or rancidity may develop, which is likely to give an unpleasant flavour to the sauce. Anchovies should be used with discretion in thick sauces, but may be used more generously in thin spicy sauces.

Garlic, shallots (or eschalots), and onions are also indispensable raw materials. *Garlic* may be used in the dry state, but preferably is preserved by a fermentation in dilute brine followed by pickling in malt vinegar for several months. This pickling treatment produces a more mellow flavour and removes some of the acrid pungency of the fresh or dried garlic. Garlic must be used very cautiously, particularly for English trade, as an excess of garlic flavour is most objectionable.

Pepper Vines Growing on a Standard.
(With acknowledgments to the High Commissioner for India.)

Shallots (or eschalots) are prepared in the same way as garlic and have a very pleasing onion-like flavour without any unpleasant after-effects. The shallot deserves more attention than it generally receives as a raw material for sauces and pickles.

Onions for sauces are generally used fresh, not pickled; if onions from different sources are used at different seasons of the year allowance must be made for the more pungent flavour of Dutch or English onions compared with Spanish or Egyptian onions. About 5 per cent. of onion or its allies can be safely used in the batch of sauce.

Lime juice is used to impart a refreshing acid flavour in some sauces. The raw lime juice not settled or refined is to be preferred, as it has more flavour and the oil of lime it contains is not objectionable when blended with the other flavours in the sauce.

Walnut juice will give a characteristic flavour, and is often used in sauces of the Worcestershire type. This consists usually of the brine in which green walnuts are preserved before pickling, or may be prepared by boiling green walnuts with vinegar.

Sugar.

Most sauces contain added sugar in addition to that normally present in the fruit. Some form of raw sugar or partially refined sugar is preferable, both on account of flavour and price. The amount to be added will depend largely on the other ingredients used and the degree of sweetness desired in the finished sauce; up to 10 per cent. will usually be sufficient. *Confectioners' ginger syrup* is a desirable substitute for sugar, as it possesses an inimitable mellow ginger flavour in addition to sweetness.

Flavours.

Flavoured vinegars are often used. Tarragon vinegar, made by steeping fresh tarragon herbs in malt vinegar, is deservedly popular; garlic vinegar, eschalot vinegar, chilli vinegar (made by extracting red peppers or chillies in malt vinegar), and even raspberry or fruit flavoured vinegars may be used. Orange or lemon peel, candied or from brine, forms a useful ingredient if economically available. For a very high quality sauce a proportion of sherry or of brandy may be included in the recipe.

Spices.

The most important ingredients, however, in determining the final piquancy of the sauce will naturally be the spices used. The quantity of spice used need not be large, but the selection and blending of the spices is a most important step in obtaining a well-balanced flavour. Only first quality spices should be used, as the cost of

Pepper Drying in Malabar.
(With acknowledgments to the High Commissioner for India.)

the spices is relatively unimportant in the sauce as a whole, and the premium commanded by full-flavoured spices is well worth while. Ground spices are generally used, as the time of extraction is relatively short, or whole spices, given a preliminary extraction in vinegar, may be used.

The more strongly flavoured spices such as cloves, pimento or allspice, ginger and chillies, mace, black pepper and cayenne pepper are used in preference to milder spices such as cinnamon, nutmeg, and the like. Small amounts of cardamom seeds, coriander, celery seed, cumin, mustard, fengugreek, and other more unusual spices can also be incorporated with advantage. Ready mixed curry powder of good quality will give a distinctive flavour if used judiciously. The blending of spices should be done so that no single spice is outstanding in the final mixture, but rather a balanced spicy flavour is obtained.

Salt is a seasoning apt to be overlooked, and it is surprising what difference the addition of 1 to 2 per cent. of salt will make to the other flavours present, and as salt is low in cost its use is well advised.

Essential oils of the various spices and herbs are often used to reinforce the flavour of the spices, but cannot take the place of spices entirely.

Thickness.

Most thick sauces contain some thickening agent, generally of a farinaceous nature, often in conjunction with a gum. Wheat flour, cornflour, sago, and arrowroot are the principal cereal thickeners. Cornflour is probably the cheapest, but is often blended with sago or arrowroot, which produce a different body in the finished sauce. Wheat flour appears to resist boiling better than the other thickeners, but there is undoubtedly room for investigational work with regard to the relative suitability of various flours as thickening materials.

Gum.

Gums of the tragacanth type are suitable as thickeners for sauce, being relatively flavourless and yielding solutions of high viscosity less affected by boiling in vinegar than gums of the acacia or dextrin type. Gum tragacanth is prepared for use by soaking in water or vinegar; it should be selected for the viscosity it produces, for its flavour (which should be neutral), and for its freedom from foreign matter. Gums from different sources are very variable and must be constantly watched.

Gums and cereal thickeners are liable to break down under the prolonged action of heat and vinegar, and for this reason the finished sauce should be cooled as quickly as possible after manufacture.

Colour.

If the finished sauce does not have the desired colour, a richer effect can be produced by the judicious use of burnt sugar colouring. It must be remembered that the maturing of the finished sauce will produce a darkening in colour, which must, of course, be allowed for. Extract of cochineal is also used to give a brighter tint to the sauce, carmine or other aniline dyes being sometimes used for the same purpose. If the sauce is to be used for export, colour will not be permitted in many countries, and the natural ingredients of the sauce, such as tomatoes and fruit, must be relied on to give the desired colour.

Recipes.

It will be readily understood that the number of possible recipes for sauces is almost endless. The question of flavouring, cost, nature of market, size of output, availability of raw materials and other factors have to be taken into consideration in building up a recipe. There is, therefore, little point in quoting formulæ for sauces. It is believed that the most useful purpose can be served by giving an example which might be taken as a base for experiments, introducing such variations as might be determined by consideration of the various factors mentioned above.

Fruit Sauce.

Dates	1 box.
Tomatoes	1 tin (10 lb.).
Raw onions, chopped	18 lb.
Garlic, chopped	2 lb.
Tamarinds	5 lb.
Orange marmalade	14 lb.
Apple pulp	2 gal.
Soy	½ gal.
16 vinegar	24 gal.
Lemons, cut up	30
Ground ginger	1 lb.
Cayenne	¼ lb.
Nutmeg, ground	¼ lb.
Mace, ground	¼ lb.

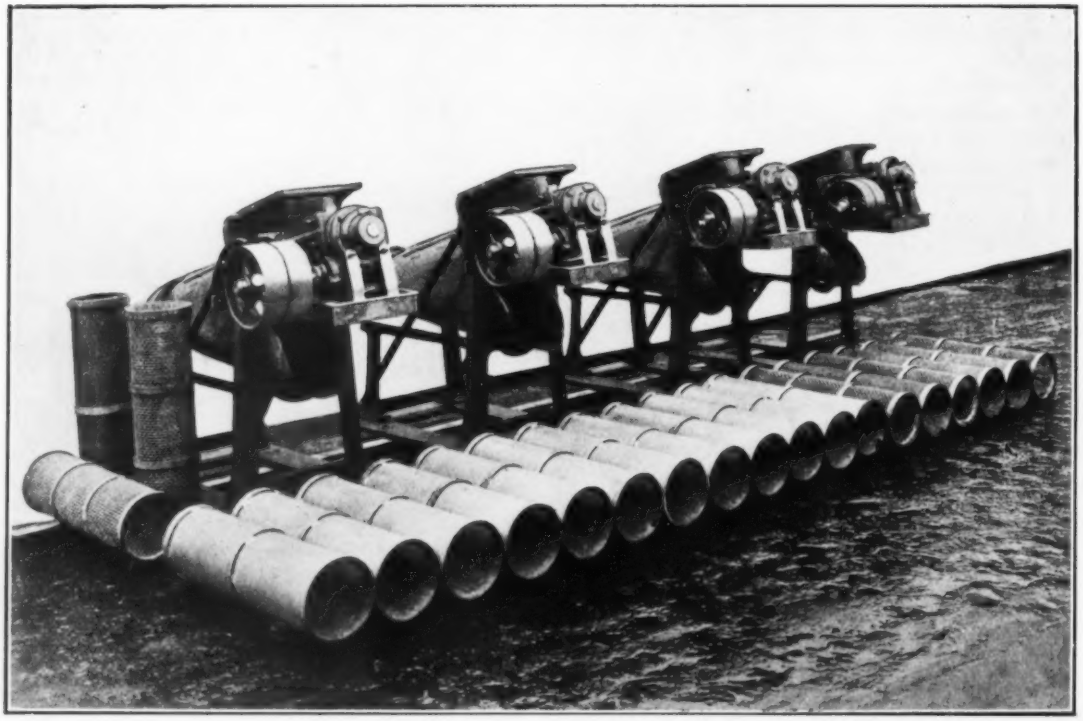
Manufacture.

Compared with the selection of the recipe and the ingredients, the actual manufacture of the sauce is comparatively straightforward. Solid materials such as fruits, onions, and the like should be minced or chopped, and mixed with the liquid portion of the batch, together with sugar and spices, and the whole brought to a good boil. The boiling may last for half an hour or may be prolonged for two hours or more, depending on the effect required.

The boiling is carried out in steam jacketed pans or kettles. Cast iron is frequently employed for this purpose and few objections can be made to its use, although undoubtedly gradual corrosion will take place and the iron is liable to flake off, particularly at the surface level. For this reason kettles made of aluminium are becoming popular, and glass or enamel lined kettles, as well as nickel and stainless steel pans, are used. Copper is objectionable, as it is liable to dissolve noticeably in the vinegar; tinned copper is not very satisfactory, as the tin lining is rarely permanent, being removed by abrasion brought about by the stirring of the sauce.

Constant stirring of the sauce is essential to get proper extraction of the flavours, and to prevent sticking to the pan; hand stirring is usual, due to the miscellaneous nature of the added ingredients.

The thickeners are added about five minutes before the end of the process, the sauce brought to a good boil, and put through a passing machine or finisher. At one time the sieves or screens of these machines were made



Stainless Steel Pulping Machines.

(With acknowledgments to Messrs. Brown Bayley and William Brierley, Collier and Hartley, Ltd.)

of copper (cast iron is used on some German models), but nowadays aluminium, stainless steel, or monel metal is employed, having a longer life, and being less liable to impart undesirable metallic flavours. If brushes are used the best bristle should be obtained and the brushes must be carefully checked each day for signs of wear, as bristles working loose are most objectionable in the sauce. The size of the screen will depend on the finished article desired, the perforations being usually in the neighbourhood of $\frac{1}{16}$ inch in diameter or less.

After screening, thick sauces should be cooled to 120° F. or less, and stored in casks for three months or more to mature before bottling. As with vinegar, this maturing results in a well-blended mellow flavour different from the raw flavour of the freshly made sauce.

The preparation of thin sauces of the Worcestershire type is liable to be more complicated, as some manufacturers make up the sauce in several stages, separated by intervals of a day or more, but the essential process is the same—viz., extraction and blending of the flavours followed by screening to remove stones, fibres, foreign matter, etc.

Bottling.

The sauce is filled cold by vacuum or gravity fillers into bottles of the conventional square sauce bottle shape, and sealed with a cork stopper or glass stopper and cork ring. English sauce bottlers might do well to consider American practice in this connection, where the screw cap lined with composition cork has displaced the stopper in vinegar bottles, and for condiments generally. Some manufacturers fill the sauce hot, as this increases ease of filling and also reduces risk of spoilage, but the effect of heat on the thickness of the sauce must be allowed for.

Spoilage.

Spoilage of fruit sauce due to fermentation is not unknown, but should not occur in a sauce with about 3 per cent. of acetic acid manufactured from sound raw materials under sanitary conditions. It is important to see that all equipment is kept thoroughly cleaned, and for this reason metal containers should be used as far as possible for handling the materials (tinned iron, aluminium, nickel or monel, or stainless steel are satisfactory). Wood must be used with caution, as it is difficult to keep thoroughly clean, and under conditions of intermittent use organisms may develop which show surprising resistance to the acidity of the sauce. This is particularly true of containers for the finished product, as the boiling of the sauce should take care of preliminary infection, unless contamination is abnormal. Barrels and vats used for storing the sauce should be thoroughly steamed and well drained before filling, particularly if the sauce is cooled after screening.

Separation of thick fruit sauces produces an unsightly appearance in the bottle, and is due to insufficient thickening material or to destruction of the thickening material by prolonged exposure to hot vinegar. The remedy is to use enough thickeners (as determined by a viscosity measurement of the finished sauce) and to avoid excessive heating of the thickening agents.

Thin sauces, of course, will always show separation of the solid ingredients, and must be agitated while filling in order to obtain uniformity.

The whole problem of sauce manufacture is seen to be more of an art than a science, although scientific study of raw materials and equipment can go a long way in ensuring uniformity and saleability in the product of the artist.

Discoloration in Cheese

Occasionally samples of cheese showing areas of dark pigmentation, around specks of foreign material, are encountered. According to Leitch the cause may be due to small particles of lead-containing material slowly dissolving and diffusing through the cheese, lead sulphide being deposited by the interaction of small amounts of sulphuretted hydrogen produced during cheese ripening. Cheese may be contaminated with traces of lead or lead compounds either as a rare impurity in annatto (in coloured cheese), as red lead from pipe joints, or as abraded solder from unions or seams.

The detection of lead in the amount necessary to cause the trouble in cheese is difficult, often indefinite, and sometimes impossible, but according to Davis (*Analyst*, February, 1932), when such causes are due to particles of solder, advantage can be taken of the sensitive molybdenum blue test for the tin accompanying the lead in the solder. A section of cheese showing darkened area and, if possible, the exposed nucleus, is moistened with water on a watch-glass and a drop of 0·5 per cent. solution of ammonium molybdate in N-hydrochloric acid is added, followed by a drop of 5 per cent. sodium phosphate. If tin is present an intense blue colour will develop in a short time around the nucleus, growing fainter towards the edges. The blue colour concentrates on the veins between the particles of curd, which stand out clearly against the darker blue boundaries. A positive test for tin in the dark patch is an indication that solder is present, the lead of which is responsible for the discoloration. Particles of iron or iron rust do not form black discolorations, and although the particles are often discernible to the naked eye, they are looked on as "dirt" or "foreign matter" and classed with particles of straw, rubber, etc., as accidental impurities. Lead is the metal causing discoloured areas which are usually responsible for lowering the marketable value of the cheese.

CITRUS FRUIT JUICES

THEIR USE IN THE FOOD INDUSTRY

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BY

S. GORDON KENDRICK

B.Sc., A.I.C.

A VERY interesting development of recent years has been the growth of the use of citrus fruit juices in Great Britain. At one time it would appear that almost the only fruit juice which was imported was lime juice, which was used for the preparation of a cordial and formed part of the official ration in the Navy, with a view to the prevention of scurvy. During the last twenty years or so there has grown up a very considerable trade in the preparation and marketing of products depending upon the supply of large quantities of lemon juice, orange juice, and recently grapefruit juice. The products in which this expansion of demand has taken place are chiefly the cordials, fruit squashes, and now mineral waters. It should be of interest, therefore, to review briefly the preparation of these products and the use of the juice in them.

Typical Recipes.

A *cordial* is, of course, prepared from refined juice—that is to say, from juice from which the cellular matter has been removed. The simplest form of cordial would consist of a solution of sugar in refined juice, with the addition of some permitted preservative. Actually such a cordial would probably not be readily saleable, as in the case of lime juice and lemon juice it would probably be too acid for normal palates. A suitable recipe would therefore be:

Sugar	4 lb.
Refined juice	½ gal.
Water	1 quart.
Preservative.	

Such a recipe would make one gallon of cordial. In Great Britain there is no standard for the amount of juice which should be present in a cordial, but in most of the British dominions there is a standard. For instance, in South Africa, fruit syrups, cordials, and squashes must be prepared with the juices of sound fruits, potable water and sugar (sucrose), with or without the addition of citric or tartaric acid or vinegar and permitted colouring matter, and must not contain less than 20 per cent. of fruit juice and 25 per cent. of sugar (sucrose), and must not contain any flavouring substance other than that naturally present in the fruits from which they have been prepared, nor any other foreign substance except glycerine or a permitted preservative or colour.

From the above it will be seen that the recipe given would contain twice as much juice as is necessary to conform to the regulations and rather more sugar. It is somewhat curious that the regulations should insist upon sucrose being employed, as one would have thought that it would have been quite permissible to use, say, invert sugar, seeing that the sucrose will inevitably sooner or later be partially inverted by the acid in the juice. It is also rather uncertain from the regulations whether the authorities would consider that the addition of an extract of lemons to a cordial made from lemon juice according to the recipe above is not allowable. Cordials and fruit squashes are often considerably improved by the addition of extracts of the same fruit, obtained usually from the peel, and in view of the fact that the regulations allow flavouring substance "naturally present in the fruits," it would appear permissible to add such extracts. The whole force of the regulation is undoubtedly devoted to securing a minimum quantity of fruit juice in the product.

A recipe for a fruit *squash* would be somewhat similar to the above. The refined juice would, of course, be replaced with juice containing the natural pulp, and it is very usual to add some extract derived from the peel to improve the flavour, and it would be difficult to see how the purchaser would be prejudiced by such addition.

In the case of *mineral water syrups*, these are intended to be bottled in a carbonated form and are usually of a higher density than squashes and cordials sold as such. A typical recipe for a mineral water syrup made from the juice containing the cells would be:

Sugar	6 lb
Fruit juice	5 pints.
Fruit extract	1 dram.
Preservative.	

The Supply of Citrus Juice.

The juices are extracted from the fruits either by hydraulic pressure or by boring processes similar in action to the home lemon squeezer. It is stated that juice obtained by hydraulic pressure is inferior to that obtained by the boring process, and the claim is made by some juice manufacturers that their juice is hand

bored. It would appear that this means that the fruit is pressed by hand against revolving borers, and it would thus be somewhat different from the hand process used in the home. Probably, if any difference does exist between the juice obtained hydraulically and that obtained by the boring process, it is due to the fact that in the boring process the fruit is selected to some extent, and unripe and unsound fruits would tend to be rejected, neither would the juice tend to come into contact with the peel, whereas in the hydraulic process the peeled fruits would probably not undergo any selection, and therefore unsound fruit might be used with a deleterious effect upon the quality of the product. Fermentation, if once set up, is very difficult to check, and undoubtedly tends to break up the fruit cells and produce an objectionable-looking product, besides giving rise to the danger of fermentation in the finished product.

Very little juice is actually squeezed in Great Britain in comparison with the quantity which comes over ready squeezed. There are two main methods of shipment of such juice. The first is in barrels, the second in hermetically sealed tins. There is an essential difference between these two methods. Juice which is shipped in barrels must, of course, be preserved chemically, and this chemical preservative, which is usually SO_2, must be present in an amount which does not contravene the Public Health (Preservatives, etc., in Food) Regulations. The barrels used are generally made of chestnut or other suitable wood and lined with paraffin wax to prevent contamination and flavours coming from the wood. After juice has been shipped in paraffin wax lined barrels the wax can often be found floating about in the juice.

When juice is shipped in tins it is, of course, sterilised by heating first. While it is true that this makes possible the keeping and storing of juice without the addition of chemical preservative, it is difficult to see what advantage this offers, except in the case of the relatively small quantities of juice which are consumed immediately the tin is opened. For squash making purposes such juice appears to be definitely inferior to that preserved initially by sulphur dioxide, since not only has it suffered deterioration due to the heating, in loss of flavour and partial destruction of vitamins, but it has to be preserved before it can be made into squash or otherwise the squash will not keep, and so the ultimate consumer gets the SO_2, just the same as with the chemically preserved juice. Furthermore, juice which has been sterilised appears to require more preservative to keep it and to be more liable to fermentation than juice which has not been sterilised but preserved straight away with SO_2.

Sterilised juice kept in tins is also liable to have a high content of iron. Some juice which was examined recently which had been kept in tins for some months had such a high iron content that it could be detected by the taste alone; those people tasting products made with it, while not realising that iron was actually present, described the taste in terms similar to what would be used to describe a preparation containing iron. It is, however, probable that if the tins were properly lacquered no such trouble would arise.

While on the question of the effect of the metals on the juice, it is interesting to note that, when making up squash, care must be taken to see that the squash does not come into contact for any length of time with metals which would dissolve in the acid of the juice. If stirrers are employed they should be of stainless steel or similar resisting metal. Stirrers made of gun metal, though heavily tinned, cause a serious deterioration in the juice if the latter is allowed to stay for any length of time in contact with it. When the juice has been preserved with SO_2, apparently the metal dissolves slightly in the acid with the formation of nascent hydrogen. The hydrogen apparently reduces the SO_2 to H_2S, with the production of a very bad odour. The effect is not great, provided the squash is not left in contact with the metal for very long, but if left overnight it can become quite marked and render the squash unusable.

Preservatives in Citrus Fruit Juices.

The position with regard to the presence of preservatives in imported fruit juices does not appear to be as clear as it might be. The preservative content is laid down by the Public Health (Preservatives, etc., in Food) Regulations. The regulations, originally published in 1925, were subsequently amended in 1926 and 1927. By the earlier regulations fruit juices could contain either 350 parts per million of sulphur dioxide or 600 parts of benzoic acid, but fruit pulp other than that of strawberries and raspberries, and therefore including citrus fruit pulps, could contain 1,500 parts of SO_2 per million. Citrus fruit juices containing the natural cells should come under the section relating to fruit pulps, since the amount of pulp in the juice will often approach and exceed that present in strawberries and raspberries in which it is obviously conceded that less than 2,000 parts of SO_2 per million may be insufficient. By the 1926 amendment the section relating to fruit pulp was amended, and it was specified that the fruit pulp should be intended for conversion into jam or crystallised glacé or cured fruit. Furthermore, an additional section was included for fruit and fruit pulp not otherwise specified, and for this latter section only 350 parts per million of SO_2 was allowed.

Thus, because a juice is not definitely imported for conversion into jam, it apparently is intended not to allow it to contain more than 350 parts of sulphur dioxide per million, notwithstanding that the manufacturing process to be carried out may reduce the amount considerably, and in any case the public is protected by the regulations referring to sweetened fruit juices and cordials. Actually it is found in practice that citrus fruit juices cannot be safely kept with less than about 750 parts per million of SO_2, and much of the juice imported contains this quantity, but cases have occurred where the authorities have refused to allow the importation of juice containing more than 350 parts per million on the ground that section 2 does not apply, but section 7a, which allows only 350 parts. Since the juice so imported for use in squashes and cordials is going to be diluted considerably both by water and sugar, and furthermore,

(*Continued on page 97.*)

ICE-CREAM MANUFACTURE

Recent advances in theory and practice commented on by ERIC HUMPHRISS

RECENT RESEARCH has been in the main concerned with the elucidation of the basic physical chemistry of the ice-cream mix, and the explanation, in scientific terms, of the phenomena associated with the chief processes to which the product is subjected in course of manufacture.

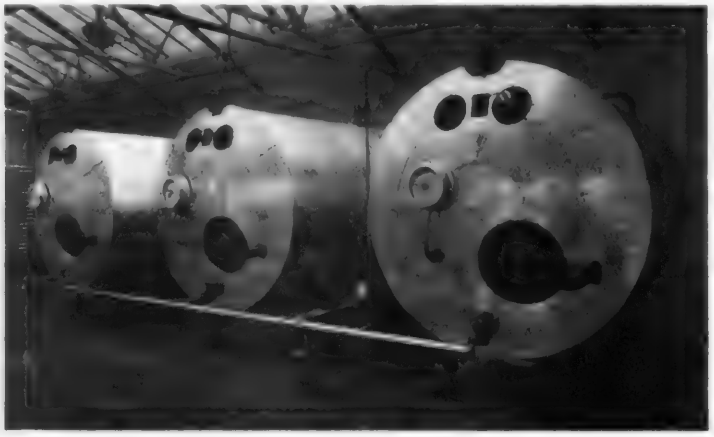
Mix itself is a complex system composed of an aqueous continuous phase containing dissolved electrolytes and non-electrolytes, colloidally dispersed proteins of various types, traces of lipoidal substances, and milk fat in the form of a finely divided emulsion. Since the most important, indeed the characteristic, processing operation—the reduction of this liquid complex to a solid by freezing—largely determines the palatability of the final product, it is hardly surprising that a considerable amount of research and investigation should centre around this section of ice-cream technology.

Whipping Ability.

The whipping ability of mixes has been investigated with the result that it has been established that gelatin and the protein fraction of the milk-solids-not-fat contribute additively practically the whole of the capacity of semi-frozen mix to retain air, and further, that the maximum overrun obtainable is limited almost entirely by the fat content of the mix. Sommer and Horrall have recently introduced a dynamic conception of air incorporation wherein they postulate that the point of maximum overrun for any given mix is reached when the rate of air incorporation equals the rate of air escape. These workers, taking into account what one might term "the microscopic mechanism of air cell formation" during freezing, come to the conclusion that the critical factor determining whipping ability is the strength of the semi-frozen wall of mix which separates adjacent air cells. While this wall strength is dependent to some extent on thickness, which in turn depends on the volume of air incorporated and the average magnitude of the air cells, experimental work has shown that it is also a joint function of several of the physical constants of the mix itself. Viscosity, surface tension, liquid cohesion, interfacial adsorption, and the degree of dispersion of the fat are all concerned in determining this composite mix constant. This recent work and the newer conception of whipping ability to which it gives rise, explain several hitherto obscure phenomena associated with overrun production. The beneficial effect of homogenisation and adverse effect of fat clumping, for example, are readily understandable in the light of the above-mentioned work.

Fat Clumping.

Fat clumping itself has also been to some extent investigated. It has been demonstrated, for example, that clumping increases with a decreasing serum solids fat ratio, and also that, whereas homogenisation pressure exerts little or no effect on the tendency to form clumps, an increase in the homogenisation temperature results in a corresponding decrease in subsequent clump formation. Double stage homogenisation has for some time now been



Glass-Lined Vats Fitted with Temperature Control Devices.

(By courtesy of Walker's Dairies, Ltd.)

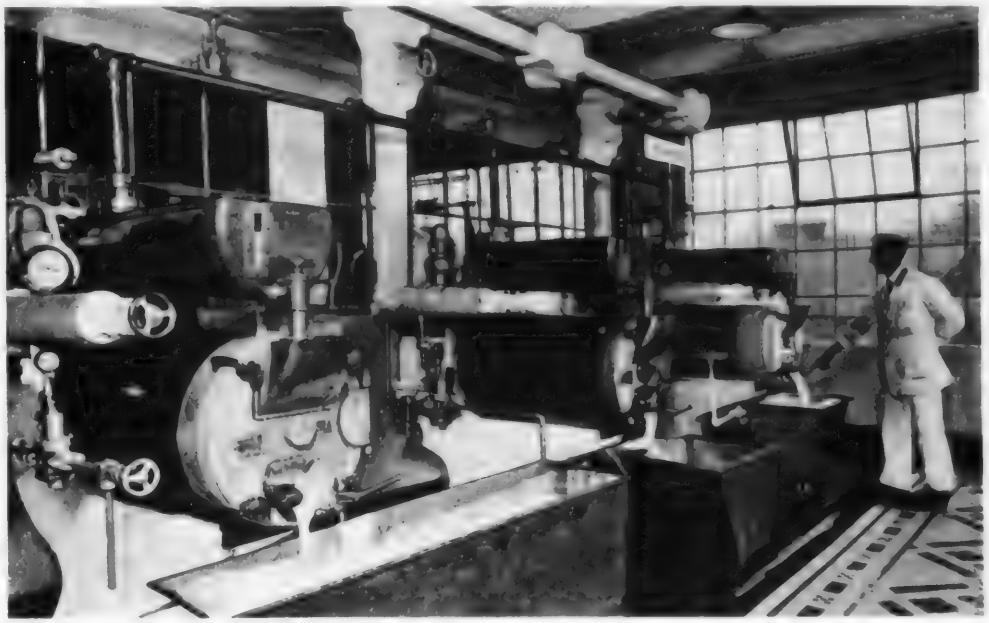
utilised as a means of overcoming this clumping difficulty. The second valve is operated at a low pressure and to a large extent breaks up the clumps immediately they are formed. Sommer and Young have recently shown that the precipitation of soluble calcium salts prior to homogenisation completely inhibits clump formation, and as the result of these and other observations the hypothesis that the negative charge on the fat particles is the determining factor in clump formation prevention becomes at least a very plausible one. Certainly factors which favour an increase in the negative charge on the fat particle suppress, while converse conditions favour, the formation of clumps, and in this connection it may be pointed out that where neutralisation of either mix or ingredients is practised, calcium salts should be avoided and sodium carbonate or bicarbonate, in stiochiometrical amounts, be used instead.

Ageing.

Some experimental evidence has been obtained which suggests that the adsorption film on the fat globules in mix consists mainly of casein and lecithin, and, further, that the protein is irreversably adsorbed. Since this adsorption does not attain equilibrium instantaneously it may, in part at any rate, explain the minimum four hours' ageing found necessary in practice in order to avoid inferior texture in the frozen and hardened ice-cream. Since Olsen first demonstrated that ageing in excess of four hours or so did not result in any significant improvement in texture, the practice, until then almost universal, has been gradually abandoned, and though a few practical men still maintain that holding at low temperatures does contribute to a desirably textured product, all the research, and the bulk of practical experience, entirely support Olsen's original contention.

Freezing and Hardening.

Considerable progress is being made in determining the actual thermal and physical changes which take place during the freezing and hardening of ice-cream. With these two processes is intimately bound up the texture and therefore the palatability of the finished product, and hence work of this type has an immediate practical importance.



A Battery of Ice-Cream Freezers.
(By courtesy of the Midland Counties Dairy, Ltd.)

It would be anticipated on theoretical grounds that the freezing curve of a mixed solution such as ice-cream mix would be interrupted by several cryohydric points corresponding to the various solutes present, and so far as experimentation in this direction has gone this has been found to be the case. Leighton, for example, found a break at $-12°$ C., which he also found to be the cryohydric point of sucrose in aqueous solution. Sommer has searched the literature for the cryohydric points of various constituents of ice-cream mix, and of those he has been able to trace quotes calcium chloride at $-55°$ C. ($-67°$ F.) as being the lowest. This means, of course, that even at this comparatively low temperature, a little of the water of the mix remains unfrozen, and Sommer uses this fact to explain the texture deterioration which inevitably ensues when ice-cream is subjected to temperature fluctuations. He points out that at hardening room temperatures an equilibrium between water as ice and liquid water exists, which will be disturbed in one or other direction by even the smallest of temperature changes. Slight warming will result in some slight thawing of ice to water which, on

refreezing, will result, according to the ordinary laws of crystal growth, in an increase in size of the ice crystals present with consequent texture deterioration. The severe heat shock often suffered by ice-cream during transport and in retailers' cabinets results in a correspondingly more severe texture decline and may even precipitate incipient sandiness.

Sandiness.

Considerable light has of late been thrown on the obscurities of this question of sandiness by some ingenious experimental work carried out by Troy and Sharp. They have demonstrated that normal frozen ice-cream does not contain lactose in the crystalline state, though, of course, during actual freezing, a mix of even less than the usual 10 per cent. or so of milk-solids-not-fat rapidly becomes saturated with respect to the lactose-liquid water ratio. As ordinarily crystallisation does not occur, this carbohydrate must exist in a super-saturated solution, and it is suggested that with a mix of normal milk-solids-not-fat content the lactose content is sufficiently low to allow of a considerable degree of freezing occurring before the spontaneous crystallisation (saturation) point is reached. When this critical temperature eventually obtains, the unfrozen portion of the mix has reached a viscous "glass" state which inhibits lactose crystallisation. On the other hand, with a mix of excessively high milk-solids-not-fat content the lactose saturation point is reached before the mix is capable of suppressing crystallisation, with the result that crystallisation of the milk sugar occurs, and we have the defect known as sandiness, which is easily aggravated by heat shock.

Stabilisers.

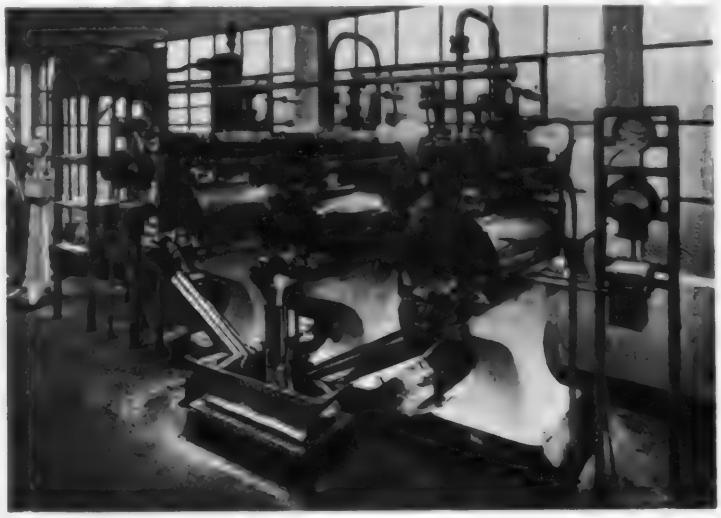
As regards stabilisers, several new substances have been marketed in recent years, though it yet remains to be proved that in the case of genuine dairy product ice-cream any of them have definite advantages over a good grade of gelatin intelligently used. Pectin has been introduced in America as a stabilising agent, but, up to the time of writing, no reliable reports as to its efficacy in this direction are available.

Smoothness.

A considerable amount of experimental evidence has accumulated to show what is almost obvious on theoretical grounds—namely, that smoothness of texture is an

Automatic Package Filling Machines.
(By courtesy of Walker's Dairies, Ltd.)

inverse function of freezing and hardening time, other things being constant; and the outstanding recent development in this direction so far as freezing is concerned is the introduction of the Vogt continuous freezer. The idea of continuous freezing is not by any means new. The original models of such freezers were discarded years ago in favour of the batch freezer because of the inherent defects of the former, but these drawbacks have now been entirely overcome. In the continuous type of machine, overrun is under accurate mechanical control, freezing is accomplished in thin films in ten to fifteen seconds, and the semi-frozen mix is drawn at 20° to 22° F.—about four degrees lower than is ordinarily possible with a direct expansion batch freezer. The net result is a decidedly smooth-textured ice-cream.



Ice-Cream Freezers with Stainless Steel Hopper.

(By courtesy of Walker's Dairies, Ltd.)

Hardening.

Attention is also being directed to the speeding up of the hardening process. One or two American firms are operating with room temperatures as low as −40° F. in conjunction with a very vigorous air circulation, and this practice has been proved to result in an improvement in the texture of the ice-cream. It is interesting to note that the leading American authorities regard hardening room design and construction as still being in the developmental stage. Rapid hardening is, of course, of little less importance than rapid freezing in its effects, actual and potential, on texture. The writer a year or more ago was enabled to conduct one or two experiments in rapid hardening which emphasised this fact. Bricks of ice-cream were frozen to 25° F. and then placed in a "brine fog freezing chamber" designed in connection with the rapid freezing of fish. In less than 1¼ hours the temperature of the centre of the brick had fallen to within 5° F. of thermal equilibrium with the brine, and, moreover, the ice-cream possessed a very smooth texture. Such a process could not, of course, be directly applied to ice-cream bricks, but the results do illustrate the large part freezing and hardening play in determining the texture of the finished product.

We in this country have still to confess to an almost complete absence of, at any rate published, research on ice-cream, and it is to our American friends that we are indebted for the advances sketched above. Perhaps when we have chemical and bacteriological standards legally defined, and have been a little more successful in persuading the public as to the unique merits of ice-cream as a national food, we shall be able to contribute our share of new knowledge to the common stock.

Spanish Canning Industry

Some interesting information on this subject has been published recently by the Department of Commerce, Washington. It is stated that, owing to the low cost of labour, and to the many small conservers operating, whose businesses would not warrant the purchase of expensive machinery, and whose output does not necessitate machinery constructed for quantity production, a large part of the work of canning fruits and vegetables is done by hand; especially such work as peeling of the fruit, placing in cans, and the labelling.

As an example of the method of canning fruit, pimentoes are, in many instances, contracted for by the producers in outlying regions and brought to the factory by truck, cart, or by train and piled in the yard until they take on the proper red colour. They are then passed through a revolving cylinder to be roasted, after which they are washed in wooden tanks or troughs, where black spots, seeds, stems, etc., are removed by hand. The cans are filled and sealed by hand and then sterilised for twenty to twenty-five minutes.

There are no statistics showing the quantity of conserved fruits and vegetables produced in Spain, and it is impossible to obtain such statistics, owing to the fact that there are so many small plants in the industry.

Spoilage of Foodstuffs by Insects & Moulds

The problem of insect infestation and spoilage by moulds of stored products is discussed by F. R. Passmore, of the Stored Products Research Laboratory, Biological Field Station, Slough.

EVERY YEAR millions of pounds' worth of man's food is consumed or spoilt by insects. Before the world's crops can be harvested, it is estimated that more than one-tenth of their worth is claimed by the thousands of species of hungry field pests, while the toll levied by insects on stored foodstuffs has been calculated in the United States as costing that country about forty million pounds annually. The field pests, by staging spectacular outbreaks from time to time, have brought against themselves the organised resources of the world's entomological knowledge and skill: science and industry are very much alive to their menace. On the other hand, because their depredations are more insidious and perhaps because the losses are borne by more than one party, no serious move has been made in this country until quite recently to check the stored product insect.

In 1927 the Empire Marketing Board made a grant to the Imperial College of Science for the purpose of investigating this problem, which, in view of the enormous stocks of imported food this country is forced to keep on hand, it regarded as one of national importance. A biological research station was established at Slough under the directorship of Dr. Munro, Professor of Entomology. Here, in the pleasant surroundings of a converted country house, began work which is probably unique: the practical application of biology, in close co-operation with physical chemistry, to the solution of all problems arising from the deterioration of stored products by insects.

Contact is maintained with industry by a survey branch, with its headquarters in London, which keeps under observation actual conditions of insect life, local climate, etc., at the docks and in warehouses, conducts breeding experiments under varying local conditions, and generally serves to bridge that unfortunate gulf which, even nowadays, still so often separates the scientist from the practical man.

Adaptability of Insects.

Although many different species of insects are found living on stored goods, the major pests are comparatively few. The conditions of life which the average warehouse offers an insect demand severe specialisation; it must, for instance, be able to live in a dry atmosphere on food which has a low water content. The Ephestia moths, perhaps the worst offenders, are typical; they can live under dry conditions to an extent which is remarkable in an insect, and feed on almost anything from dried figs to flour, from chocolate to cigarettes. Originally tropical insects, they have become adapted to temperate conditions and are now firmly established in many European warehouses. There is little doubt, however, that the main source of infestation by these and other insects is still from overseas, and if they could be excluded from all future shipments, those which are established here could be easily dealt with, once and for all. But it is impossible, and will be so until much more is known about the insects themselves and conditions overseas, to eliminate insects from produce ships, and at present time is best employed in perfecting means of killing them on arrival.

Resistance to Fumigants.

When the chemical staff of the Slough laboratories turned its attention to practical fumigation, it found that there were surprisingly few really effective methods in use. Too often in the past, fumigants and fumigation methods had been tested under conditions which seem to have left out of account the nature of the insects which were to be exterminated. Insects lead very complicated lives; starting as an egg, most species pass through two other completely different life stages before becoming adult insects. During these stages they may vary enormously in their resistance to poisonous gas, or, if low temperature sterilisation is employed, to degrees of cold. A few figures illustrating this variability will indicate how essential entomological knowledge is when dealing with insect problems. To give a 100 per cent. kill in a carbon disulphide fumigation against the flour moth, *Ephestia kuehniella*, twice the strength of gas sufficient for the adult would have to be employed to kill the grubs, and five times to kill the pupæ or chrysalides.

Influence of Temperature.

Again, the insects' resistance to gas is also liable to vary with the temperature prevailing at the time of the fumigation; thus the concentration of ethylene oxide necessary to kill the flour beetle, *Tribolium confusum*, at a temperature of 20° F. in a fumigation lasting three hours

would have to be increased six or seven fold to kill the same insects in the same time at 50° F. To complicate things still further, insects which have been living in a different temperature from the one prevailing at the time of the fumigation may possess greater or less powers of resistance to gas than would be expected if this "conditioning" factor were left out of account when calculating the dosage.

Low temperature has been found to be the most effective practical weapon against a moth pest of tobacco, whose depredations have cost the industry many thousands of pounds. Experimenting on the lethal temperatures, the entomologists found that the most resistant

View of the Laboratories at the Biological Field Station, Slough.

period of this insect's life is the egg stage. But the variability did not stop there. It was further discovered that the one- and three-day-old eggs are considerably hardier than eggs of any other age; thus, when experimenting to determine the necessary duration at different temperatures, the entomologists were faced with the further problem of breeding one- and three-day-old eggs to coincide with other arrangements.

Two Insectaries at the Biological Field Station where Large Numbers of Insect Pests are Bred for Use in Fumigation Experiments.

Insects breed quickly and their fecundity is so great that it is essential that any form of sterilisation must be 100 per cent. efficient; if a few individuals are left unharmed in produce which is to be stored for a long time, they may easily re-develop a serious infestation.

Distribution of Fumigants.

The application of fumigants under practical conditions so as to give the best results with a minimum of waste and danger presented to the chemists a fresh set of problems. How does a gas behave when released in, for instance, a warehouse? There was no satisfactory answer to this most important question until a method of gas sampling was perfected by Dr. Page. Evacuated glass flasks containing a suitable reagent were so constructed that they could be opened electrically; a number of these, safely protected in numbered metal containers, were distributed about the chamber to be fumigated at different

Members of the Survey Branch of the Stored Products Research Laboratory Examining Freshly Landed Cacao Beans for Signs of Insect Infestation.

heights between ceiling and floor, at varying distances from the source of the fumigant and buried deep in the sacks or cases of produce. Wires connected them to a switchboard and battery outside. At intervals during the fumigation, from the time the gas was liberated until the chamber was opened up, the flasks were unsealed. Afterwards, when the amount of gas absorbed in each flask came to be calculated, a graph could be drawn which was, in effect, a picture of the behaviour of the gas in the chamber. These graphs showed, among other things, that in practice only about half the concentrations which calculations based on dosage and volume indicate should be present are ever actually reached.

Effect of Climate.

Research which may have far-reaching effects on warehouse construction and hygiene is being carried out at Slough on the effects of different climates and climatic changes on insects. Some warehouses are freer from pests than others, apparently similar in all respects and storing the same class of goods, and it is probable that a slight difference of local climate, either in the temperature or humidity, may be the cause. The difficulties of maintaining, artificially, small climatic systems for experimental purposes, are many, but a special incubator has been designed which will enable breeding tests to be carried out under about sixty different conditions of temperature and humidity at once. When the limits beyond which a troublesome pest cannot thrive are known, it may be possible to put a warehouse outside them by suitable ventilation.

Moulds.

No account of the Stored Products Research Laboratories would be complete without some mention of the mycological section. As with the field and store insects, so with the fungus diseases of crops and the moulds which spoil stored foodstuffs; mycological work in the past has been almost exclusively directed to field research. So little is known about the hundreds of species of blue, green, and yellow moulds which will grow on any organic material if conditions of moisture and temperature are favourable, that so far the work has been mostly collecting and naming them. With fuller knowledge of the deleterious effects of the different species and their essential conditions of moisture, etc., for growth, it will be possible to decide beforehand whether a given store is suitable for goods liable to a particularly damaging mould. For instance, it is already known that the mould requiring the least amount of moisture to grow on cocoa beans is *Aspergillus glaucous*, and that dry beans will not pick up enough moisture from the air to support this organism if stored in an atmosphere drier than 82 per cent. relative humidity.

The work of the station covers a large and almost new field: fresh cases of serious damage by insects or moulds are continually being brought to its notice, either by the survey branch or directly by firms and trade associations. Indeed, the number of practical problems of control that it has been called upon to tackle during its few years of existence shows how great was the need for an institution where scientific knowledge and practical experience can be brought to bear on storage infestation problems.

Checking the Humidity Recording Apparatus by means of Dew-point Determination. An Entomologist at Work in a Wapping Warehouse.

SHEA NUTS

by H. W. AVIS

SHEA NUTS as a useful commodity have been almost entirely neglected by Great Britain, though the tonnage at present available from West Africa is very large. It was estimated by the Department of Agriculture for the Gold Coast in 1927 that the potential supply from that country exceeded 120,000 tons.

Up to the present time there have been practically no exports from the Gold Coast, chiefly owing to the prohibitive cost of transport. The nuts have to be taken over 200 miles by motor lorry to a rail centre for transport to the coast. However, an experimental plant for the extraction of shea butter on the spot, to save the cost of transport, is being tried out on the Gold Coast; the report of the trials has not yet been published.

In the case of Nigeria the question of transport is much easier, several of the centres for shea nuts being situated on the railway, which has co-operated by reducing its charges on this class of goods, with the result that, according to the Trade Report of Nigeria for 1931, a total of 7,433 tons of shea nuts, valued at £45,619, was exported to Belgium and Holland. It is only a very small portion of the total production which could be exported, despite the huge quantities used by the natives themselves.

The shea tree *Butyrospermum parkii*, which is very abundant in several parts of the Northern Provinces, grows to a height of over fifty feet. In general appearance and leaf it resembles the English oak. It is very hardy and first bears fruit when it is from ten to fifteen years old, reaching full bearing capacity at from twenty to twenty-five years of age. The flowers, which are strongly scented, grow in clusters from the leafless branches during January to March. They are immediately followed by the leaves and later by the fruit, which ripens from June to August.

This fruit consists of an apple-green skin enclosing a soft fleshy layer, the mesocarp, in which is embedded one or more kernels enclosed in a shell, the endocarp. When unripe the mesocarp is tough and has an astringent taste. The endocarp is soft and white. On ripening, the mesocarp develops a sweet taste and becomes very soft; and endocarp, on the other hand, darkens in colour to a light brown, becoming quite hard and rather brittle.

The natives, while picking the fruit, often eat part of the mesocarp, but the remainder, containing the endocarp, is treated in one of two ways. It is either kiln-dried or sun-dried, depending chiefly on the custom of the tribe which is handling the nuts.

If the fruit is to be sun-dried, it is boiled with water to remove the mesocarp. This process also kills the embryo, thus stopping germination and inhibiting any enzymatic action. It also causes a slight shrinkage of the kernel, which enables it to be removed more easily from the shell when required.

After boiling, the nuts are spread out in the sun and are considered dry when the kernel makes a harsh rattling sound if the nut is shaken; usually it takes from five to ten days before they are really dry. The nuts are then cracked between two stones, winnowed, and put in the sun for at least ten days longer. By this time the moisture should have fallen from about 40 per cent. in the freshly cracked nuts to about 7 per cent. When they are squeezed, the kernels, if dry, should show no signs of compressing, and if several are shaken together in the hands they should give a high-pitched rattle.

If the nuts are kiln-dried, they are not usually boiled, but are either placed in heaps or in shallow pits and allowed to ferment; it is thought that the heat generated during this fermentation is sufficient to kill the embryo.

After several days the kernels are put into a kiln, which is built of mud and has a well underneath in which is built a small fire. About 150 to 200 lb. of nuts are usually heated at one time, and the temperature does not usually exceed 90° C. at the bottom and 60° C. at the top. Heating is usually continued for four to five days and nights; when the nuts have cooled they are cracked in the manner already described.

As long as care is taken during the roasting so as to ensure that none of the kernels are burnt, it appears that this method is really preferable, because more moisture is driven off and the whole process takes much less time; also, unless the kernels are thoroughly dry, enormous losses will occur during transit.

If properly carried out, either sun- or kiln-drying will produce nuts which will satisfy manufacturers' requirements in this country. It is possible for the nuts to arrive in this country with a free fatty acid content of less than 6 per cent. and an oil content of over 46 per cent., with the possible exception of certain nuts from Zaria, which have abnormally low oil content.

It would appear that the neglect of these nuts by many manufacturers of edible oil products, due to the high unsaponifiable content, is not justified in the case of oil for edible purposes, as there is no proof as yet forthcoming as to its indigestibility or as to the question of its being in any way detrimental to health.

As will be seen from the table on p. 97,* the amount of oil is high and the free fatty acids reasonably low.

The oil or, as it is usually called, shea butter, when extracted from the nuts in the native fashion, is of a rather dirty grey colour, with a strong taste and smell. It is prepared by crushing the kernels and boiling with water. The substances which rise to the top are skimmed off and boiled with water again, after which the fat, which has risen to the top again in a more purified condition, is allowed to solidify. It is removed and heated

* *The Eighth Annual Bulletin of the Agricultural Department of Nigeria, August*, 1929.

The Shea Tree (*Butyrospermum parkii*).

in an earthenware pot; finally, when cool, it is cut into lumps about 1 lb. in weight, wrapped in leaves, and sold in the native markets.

The product when manufactured from the nuts in European countries is an almost white, stiff, plastic fat, melting between 23° C. and 25° C. and sometimes higher. It can be separated into stearine and oleine. According to Bolton,* the stearine has a melting-point of 55° C. (complete fusion) and the oleine has a setting-point of 24° C. Both the stearine and the oleine are very good for use in edible products, either combined with other oils in the form of margarine or prepared as a baking fat. The oleine can also be used as a frying oil.

It is said that there is more than usual difficulty in refining this fat, but G. de Belsunce* describes a method by which it is claimed that it can be refined with a very

* *Oils, Fats and Fatty Foods*, by F. R. Bolton.

* *Bulletin des Matières Grasses*, 1926, Nos. 7 and 8; 1927, No. 1.

The Native Preparation of Shea Butter

small loss of oil in the soap stock. The method consists of steaming the oil to remove the disagreeable odour and taste, after which it is treated with a solution of sodium carbonate, and, when the soap stock has been removed, it is treated in the usual manner and, in this method, is finally bleached with persulphate.

If properly refined, shea butter keeps a long time without going rancid. Shea nut cake, after the removal of the oil, is very high in carbohydrates, but low in proteins; it is therefore a very useful adjunct in a compound cake for feeding cattle.

The entire nut can be utilised, and there are many uses to which the fat might be put; for instance, as a toffee fat, a chocolate fat, or for domestic purposes. Another useful product would thus be added to those already available within the bounds of the Empire.

Prepared by	Source.	Percentage of Water.	Percentage of Oil (Dry Weight).	Percentage of Oil (As Received).	Percentage of Free Fatty Acids as Oleic Acid (3 Months in Bags).
Youriba, sun dried	Jebba	7·36	51·8	48·0	2·71
Mixed, sun dried	Jebba	7·86	52·4	48·3	3·76
Youriba, sun dried	Bode Sadu	6·30	54·7	51·2	3·81
Youriba, sun dried	Bode Sadu	7·10	51·9	48·2	2·17
Hausa, sun dried	Zaria	7·87	46·1	42·5	2·75
Gwari, kiln dried	Minna	5·86	52·6	49·5	3·72
Nupe, kiln dried	Badegg:	6·37	52·7	49·3	4·33
Nupe, kiln dried	Juafu	6·84	52·2	48·6	3·92

CITRUS FRUIT JUICES

(*Continued from page 87.*)

since the squash and cordial themselves must not contain more than 350 parts of SO_2 per million, it seems unreasonable and unnecessary to lay down such a low maximum for the imported juices themselves.

Sources of Citrus Fruit Juices.

The present source of most of the lemon juice imported into Great Britain is Sicily. Orange juice comes from Spain and Sicily. The more recently introduced grapefruit juice initially came largely from the U.S.A., but a considerable quantity is now imported from South Africa, and smaller quantities from the West Indies and Australia. Juices from these various sources vary somewhat in flavour and appearance, but by judicious blending they can all be used with success in squash making. The South African variety is of good quality, but does not come to this country till rather late in the year, shipments arriving initially about June. American grapefruit juice, on the other hand, is available earlier in the year, and the same applies to the West Indian variety.

It is unfortunate from the point of view of Empire producers that the season during which they can produce the juice does not coincide quite with the season during which the juice can be most profitably used, with the result that if Empire juice is employed, say from South Africa, it has to be stored for a considerable time before use, with a consequent liability to deterioration and an obvious increase in overhead costs due to the cost of storage. However, there does not seem to be any reason why the production of fruit for squeezing should not be extended to both oranges and lemons by Empire growers of fruit, particularly in South Africa and the West Indies and possibly also Palestine. The new tariff gives a marked preference for Empire products, which should outweigh any cost incurred through storage charges, besides which it must not be forgotten that the season in Sicily is equally as short as in South Africa, although at a different time of the year, so that while the juice shipped, say, in February from Sicily commences to be used in a short time, some at least which is to be used towards the end of the year must be stored for this period, whereas the South African variety would at the end of the year be fresh and in good condition.

At present the squash and cordial industry is largely affected by seasonal variations, but the present trend is for squashes to be sold more and more all the year round, as the public realises to an increasing extent the health value of these products. It would appear, therefore, that a good opportunity exists for Empire producers of orange and lemon juice to obtain a large share of the British market.

THE BAKERS' AND CONFECTIONERS' EXHIBITION

MEMBERS of the trade, more particularly amongst our readers outside the United Kingdom, will be interested to learn that the thirty-seventh Bakers' and Confectioners' Exhibition and Market is to be held this year from September 2 to 8, as usual at the Royal Agricultural Hall, London. Members of the baking trade should make a note of this important week, and those firms who supply the trade should, if they wish to be represented, make early application for particulars of spaces available.

Bread Wrapping

T. H. Fairbrother, M.Sc., F.I.C., examines the practice of bread wrapping from chemical, physical, and bacteriological standpoints.

THE PRACTICE of bread wrapping, which is becoming popular in England, is of American origin, and was largely due to an agitation for "Pure Food" inspired by the Women's Clubs. Every possible precaution may be taken by the miller to produce clean and wholesome flour, and the baker may be scrupulous in his personal and bakery cleanliness, and yet the loaf delivered to the housewife may not be clean and wholesome. Almost everyone at one time or another must have seen the morning delivery of bread, in open vans, exposed to contamination from the air. The writer has seen bread standing in a van in a street side by side with the municipal dust-cart, into which the accumulated filth and garbage of a week was being vigorously tipped. Occasions are not unknown when the delivery man has dropped a loaf into the mud of the street and then wiped it on his not too clean coat sleeve. From the point of view of cleanliness, therefore, there can be no doubt that the wrapping of bread is a most desirable practice, which more than justifies the extra cost involved. However, the writer has no intention of dilating on the æsthetic advantages of bread wrapping, but rather of investigating how this practice influences the quality and general properties of the bread so wrapped.

Strangely enough, most of the investigation on the subject was carried out by a commission of scientists appointed by the Association of Master Bakers in America. The Association believed that the results obtained would kill the idea of bread wrapping and so spare the members from the additional trouble and expense. The report, however, gave a decided, though not unqualified, verdict in favour of bread wrapping.

In this article it is proposed to review briefly the effect of bread wrapping on the chemical composition of the loaf, the bacteriological effect of wrapping bread, and the loss of moisture in wrapped bread compared with unwrapped.

Loss of Moisture.

There has been a considerable amount of experimental work done on the rate at which moisture is lost from wrapped and unwrapped bread. Barnard and Bishop found that bread wrapped in wax paper lost only 7·6 per cent. moisture in seven days, whereas unwrapped bread lost as much as 17·3 per cent. Investigations were also carried out at the Bacteriological Laboratory at Washington. These showed that bread wrapped in waxed paper three hours after leaving the oven lost only 0·29 per cent. of its weight after forty-two hours, and the average loss of wrapped bread in that time was 0·44 per cent. An unwrapped loaf, however, lost 7·79 per cent. in the same time. A loaf wrapped in parchment (butter) paper lost nearly 5 per cent. of its weight. The report emphasises the fact that during the whole period of the test—114 hours—nothing disagreeable was detected in any of the wrapped loaves. The loss increased progressively with the age of the loaf, but was always less in those loaves wrapped in wax paper than in loaves wrapped in any other varieties of paper, or in loaves not wrapped at all.

Apart altogether from cleanliness or keeping properties, the reduction of evaporative loss in wrapped bread has an economic aspect. The Weights and Measures Act compels a baker to sell a loaf which is correct weight when sold, which may be many hours after the loaf has left the oven. It is a common practice to scale a little extra dough to make up for any possible loss. If the bread is wrapped immediately, the loss is negligible and a considerable saving of dough can be effected.

Staling.

The changes in composition of bread known as staling are very complicated and not clearly understood, but undoubtedly moisture has some influence. Katz, to whom we owe much of the work on this problem, concluded that there existed within the crumb of bread a physico-chemical equilibrium. At a temperature between 120° and 212° F. normal fresh bread is the stable form, whereas at room temperature 32° to 77° F. stale bread is the stable form. The starch granules composing the crumb are colloids, which hold a considerable quantity of water in combination. Fresh baked bread contains much more water in the interior than in the crust, but as the bread grows older the ratio of the water content between crust and crumb is changed, the "fixation" water of the crumb being absorbed by the relatively drier crust. Boussingault studied the distribution of moisture and observed that by heating the crumb to 158° F. it became in every respect like fresh bread. Bibra confirmed this, but pointed out that when the water content falls below 30 per cent. heating does not remove staleness. He found that when the percentage of water does fall below 30 per cent. the bread can be freshened by immersing in water for a few seconds and then heating to 175° F. Bibra's explanation is that fresh bread contains water in the free

state, and, on keeping, the water gradually enters into chemical combination. On reheating, the union of starch and gluten with the water is severed and the bread becomes fresh, provided sufficient water is present. It is obvious that wrapping bread could not prevent these changes occurring, but by the prevention of surface evaporation the practice keeps the moisture there, and this retards the development of staleness. According to a report by the Indiana State Board of Health, ordinary baker's bread retains its good condition for three, four, and in some cases five days when wrapped in waxed paper, while an unwrapped loaf becomes stale and unpalatable at the end of two days.

According to Thomas, of the Food Department, North Dakota, unwrapped bread loses moisture rapidly, together with its flavour and aroma. He also found that wrapping does not prevent the loaf from staling after thirty-six to forty-eight hours.

The most extensive published investigations on the chemistry of wrapped and unwrapped bread were carried out by Barnard and Bishop, of the Indiana State Board of Health. Their conclusions were that:

1. In general the chemical data confirm the observations on the physical appearance of the wrapped and unwrapped loaves. Hundreds of analyses serve only to confirm each other. It is clear that the wrapping of bread in waxed paper retards the escaping of moisture and tends to the preservation of the colloidal condition and the physico-chemical equilibrium noted by Katz, the destruction of which results in staleness. The belief that the moisture of the crumb is imparted to the crust, which thereby loses its crispness and becomes soft, is not borne out by the results of experiments, which show conclusively that in almost every case the loss of the moisture content of the crumb is accompanied by similar and almost exactly parallel loss of the moisture content of the crust. Observations to the contrary have perhaps been in error because of the usual custom of comparing the feel of the wrapped and unwrapped loaves on successive days, instead of comparing the texture of the crust of the wrapped with the crust of a freshly baked loaf. The conclusions as to the loss of moisture, while somewhat surprising, appear to be fully justified by the results of the numerous experiments.

2. It has long been held that bread, on keeping, develops an increasing acidity, which is customarily expressed as lactic acid. The work of White disputes this belief. Our experiments show conclusively that lactic acid acidity does not develop in the unwrapped or wrapped loaf, in the case of ordinary breads, within six days after baking.

3. The use of waxed paper wraps does not injure the quality of the loaf after the third day. Up to that time the quality, both as to condition of crumb and the flavour (or aroma), is enhanced by the use of wrappers. Unwrapped bread loses its freshness after the first day.

Bacteriological Effects.

It is generally admitted that a loaf of bread as it leaves the oven is sterile—at any rate, on the surface. In the interior, spores of the rope-forming organisms may persist, but most pathogenic bacteria would be destroyed at the temperature of the interior of the loaf (about 100° C.). If precautions are not taken to protect the loaf after baking, however, the surface may rapidly become infected. In a report to the National Association of Master Bakers of America, Sadtler states that he found *B. coli* on the surface of 17 per cent. unwrapped bread samples. Wrapped bread in the same investigation showed relatively few bacteria, and pathogenic organisms were absent. A very complete bacteriological examination of wrapped and unwrapped bread was carried out by the Department of Agriculture, Washington, in which it was established that:

1. Bread as it comes from the oven has a practically sterile crust.

2. Bread kept for only one hour before wrapping retains heat and moisture sufficient to favour growth of organisms.

3. Bread may become contaminated with organisms while cooling, and it should be wrapped as soon as it is sufficiently cool.

4. The surface of wrapped bread purchased from retail shops was much more nearly free from organisms than unwrapped bread obtained from the same sources at the same time, and fewer loaves of wrapped bread contained any of the *B. coli* group.

The results of the bacterial counts are given below:

		No. of Organisms per Gram Developed after 4 Days' Incubation on—				*Number of Moulds per Gram Developed after 6 Days on Wort Agar at 25° C.*
		Nutrient Agar at—		*Wort Agar at 25° C.*	*Dextrose Shake Agar at 37° C.*	
		25° C.	*37° C.*			
Unwrapped Bread	Max.	7,000	5,500	10,000	7,000	1,600
	Min.	190	70	110	40	20
	Av.	1,917	1,186	1,105	864	482
					300	
Wrapped Bread	Max.	900	190	500		500
	Min.	20	20	less than 10	less than 10	10
	Av.	136	80	81	44	82

62 per cent. of the samples of unwrapped bread showed *B. coli* organisms; only 7 per cent. of the wrapped bread showed the presence of these bacteria.

These investigations were carried out some years ago, and with the more efficient machinery now available more striking figures might be obtained if the tests were repeated.

From the foregoing discussion there can be no doubt that from the chemical, physical, and bacteriological standpoints bread wrapping is a most desirable practice. There is another point of commercial importance—the advertising value. If a suitable design is printed on the wrapper, the consumer gets used to a particular brand of bread and after a time asks for it. From all points of view the wrapping of bread seems to be advisable, and it is surprising that more bread in this country is not wrapped.

JELLY MAKING

A Short Discussion of Fundamental Principles

SINCE GELATIN forms the keystone, so to speak, in building up a recipe for jelly making, particular attention must be given to its proportion in relation to the other ingredients and to the choice of a suitable grade.

On the assumption that the jelly strength of the jelly is almost entirely dependent on the properties and quantity employed of the gelatin, it is obvious that the various samples submitted should be carefully tested. If it is intended to produce a pint tablet, then that tablet must contain sufficient gelatin to form a jelly of the requisite strength when diluted with water to a pint, and this consideration, taken in conjunction with the weight of the tablet, determines the proportion of gelatin to be used in the recipe.

Recipes.

Assume that a tablet is to make one pint of jelly. This tablet usually weighs 5 oz. and contains about ½ oz. (say, 0·55 oz.) of gelatin—*i.e.*, 11 per cent. In order to provide for good keeping qualities in the finished product, its water content should not exceed 20 to 22 per cent. Moreover, the proportion of glucose should approximate to 30 per cent. Upon these considerations Watts (FOOD MANUFACTURE, June, 1930, p. 157) bases the following formula:

Gelatin	11 lb.
Sugar	44 ,,
Glucose	30 ,,
Citric acid	12 oz.

to give an output of 100 lb. having a moisture content of about 21 per cent.

Two formulæ given by John Elsbury for table jellies are as follows:

	I.	II.
Gelatin	11 lb.	11 lb.
Sugar	52½ ,,	39 ,,
Glucose	19½ ,,	21 ,,
Acetic acid (90 per cent.)	4 oz.	3 oz.

Elsbury recommends acetic acid in packet jellies in preference to citric acid owing to its anti-mould properties, but in calves'-foot jelly citric acid is stated to be best, as in this case the danger of mould is overcome by sterilisation.

Colour and flavour have not been introduced into the formulæ quoted, this matter being left to the particular requirements of the manufacturer.

Gelatin.

The selection of a suitable grade of gelatin is a matter of great importance. Particularly is it important to compare various samples in respect of the strength of the jellies prepared from them. These tests should be carried out on jellies to which the same proportion of acid has been added as will be used in manufacture. It should be borne in mind that the jelly strength will be dependent on a number of factors in addition to the amount of gelatin employed, such as temperature and *p*H. The test for strength of jelly must therefore be carried out under identical conditions in each case. Such a test will indicate which sample will most economically provide the jelly strength required. In addition, other factors such as clarity, colour, taste, smell, and quantity and type of ash present will also have to be taken into consideration. The presence of relatively large amounts of calcium and phosphate in ash often leads to cloudiness, although this trouble may arise from the presence of fat in the gelatin.

The Process.

If sheet gelatin is used it must be soaked in cold water until it becomes supple. The water should have been previously boiled. If powdered gelatin is used it should be moistened thoroughly and allowed to stand for a short time.

Bring 1½ to 2 gal. of water to boil in the steam pan. Shut off the steam and stir in the sugar and glucose. Turn on the steam. Watts says the solution should be boiled to about 245° F. to yield a syrup of some 77 lb. weight. Elsbury advises simply to boil up to 270° F.

The steam is then shut off and the gelatin, after draining, is stirred in until it has dissolved. Another way is to transfer the syrup from the steam pan to a bogie or carrying pan, and then to add the soaked gelatin to it.

It is a good plan to pass the mixture through a fine hair sieve to remove suspended matter.

Finally, the acid, colour, and flavour are added while stirring. The mixture is allowed to stand for a few minutes to permit the scum to rise. This is then skimmed off, and the liquid jelly is ready for pouring into tins or upon slabs. Constancy of weight in the final output should be aimed at in order to ensure jellies of reasonably constant strength.

There are, of course, many possible departures from the basic formulæ given above. In the preparation of *calves'-foot jelly*, for example, Elsbury recommends the following procedure:

Impressions at the B.I.F., Olympia, 1933

WE HEARD one or two complaints from exhibitors on the opening day regarding the scarcity of onlookers at this year's Fair. Last year the crowds were very much denser, it is true, but the charge for admittance which has now been made, while serving to keep away the more frivolous element of the public, has also, we think, singled out prospective buyers for better attention, and thus made the Fair a business proposition rather than merely a public amusement.

Probably the best position at the Olympia section is taken up by the Empire Marketing Board. Food is here the dominant *motif*. In addition to the composite exhibit arranged by the Food Manufacturers' Federation, there is a cinema devoted to the illustration of industries within the Empire. The display in all covers an area of over 13,000 square feet, while the increased number of Dominions and Colonies represented now totals nineteen. The Empire Marketing Board section is this year made entirely of metal and glass to permit of brighter lighting effects, and the attractiveness of the display has benefited accordingly. In passing, one cannot fail to notice the excellent Canadian exhibition of preserved foods—canned fruits, vegetables, milk, and soups—as well as the Dominion's speciality, tomato ketchup.

England and Wales show a large variety of home-produced foodstuffs, including canned and bottled fruits, honey, and dairy produce. Scotland displays tinned fish. The Australian and New Zealand exhibits are certainly worth attention, as is also that of South Africa, to whom the honour now falls of being the largest exporter of oranges in the Empire. The South African display of fruit could hardly be improved upon; while the Malaya stand amply demonstrates how that Colony has doubled its exports of pineapple during the past ten years. Trinidad and Tobago show interesting exhibits of cane sugar and arrowroot.

New ideas may possibly be inspired by an inspection of the Mauritius display of native jams and sweets, such as lemon pickles, paw-paw jam, and guava cheese.

Quite close to the Empire Marketing Board exhibit is the Scientific Instrument section. Included in this are balances and other laboratory apparatus of F. E. Becker and Co., the temperature control apparatus of Short and Mason, Ltd., and the Tintometer (for the defining and specifying of colour).

On the same floor are represented Robinson and Sons, Ltd., of Chesterfield; W. J. Bush and Co., Ltd.; A. Boake, Roberts and Co., Ltd.; Williams (Hounslow), Ltd.; the Carbon Dioxide Co., Ltd.; Ozonair, Ltd.; and the Corrugated Packing Materials Co., Ltd. Imperial Chemical Industries, Ltd., are also exhibiting here, as well as in the Grand and National Halls.

Other notable exhibitors are Transparent Paper, Ltd., who display a selection of foodstuffs and confectionery wrapped in Diophane; the Viscose Development Co., Ltd.; Sutax, Ltd.; the Thames Board Mills, Ltd.; the Thompson and Norris Manufacturing Co., Ltd.; and the Metal Box Co., Ltd., whose exhibit (on the second floor of the Empire Hall) is a very comprehensive one.

A display of decided interest, on the same floor, is that of Canada Foils, Ltd., of Toronto, whose London representatives are Johnston, Horsburgh and Co., Ltd. The decoration of this stand is carried out in a bright arrangement of aluminium foil, an article in which the firm in question specialise. Canada Foils, Ltd., occupy a large establishment in Toronto and find employment for over 300 workpeople. Although comparatively new to this country, they are well known on the other side of the Atlantic. Their chief lines are metal foils for such purposes as cheese wrapping and transparent foils printed in colour. The former are also used in tea, ice-cream and confectionery packaging, and may be had in aluminium, tin, lead, or composition. The foils supplied for cheese wrapping are said to be specially designed to obviate discoloration. The transparent foils (of the cellulose type) may be had in sheets or in strips, printed in from one to six colours. The same firm also supply a wide range of coloured metal foils and foil-covered boxes for the packaging of chocolates, etc.

To enumerate even a fraction of the interesting exhibits, however, is out of the question. Boxmakers and manufacturers of plastic mouldings, transparent papers, and other packaging aids are well in evidence. Many of our readers are also exhibiting, while a number of other firms of great interest to the industry have booked space at the Birmingham section. These latter include W. and T. Avery, Ltd., the British Thomson-Houston Company, Fredk. Braby and Co., Ltd., G. A. Harvey and Co. (London), Ltd., and N. Greening and Sons, Ltd., of Warrington.

Sprinkle ½ lb. of egg albumen in 1 gal. of cold water contained in a jar and allow to stand overnight. Also, leave overnight 10 lb. of gelatin immersed in 6 gal. of cold water.

Next day, place 3 gal. of water in a steam pan together with 12 oz. of citric acid, 6 cut lemons, and sufficient cloves, cassia bark, and coriander seed to provide the required flavour. Bring to boiling-point and add 20 lb. of white sugar. Stir well and boil gently for a minute or so. Then shut off the steam.

Now add the gelatin and water and stir well. Follow this with the albumen after stirring. Turn on the steam gently and continue stirring until boiling-point is reached, but do not boil.

Shut off steam and allow to stand for 15 minutes. After skimming pass the liquid through jelly bags until quite bright. This should be done in a hot chamber.

Fill into bottles, cap, and sterilise.

Similar methods may be adopted in the preparation of jellies flavoured with mint, tarragon, etc.

TRADE NOTES

Marmalade Bitters.

An enquiry in the issue for last December concerning "bitters" used in marmalade has evoked some interesting information on the subject from Messrs. Stafford Allen and Sons, Ltd.

They state that during the war they supplied *extract of quassia* for the purpose of imparting the necessary bitterness to marmalade made with sweet oranges, owing to the difficulty then experienced by manufacturers in obtaining the Seville variety.

The quantity required was very small, somewhere in the neighbourhood of ½ oz. to 1 cwt. of marmalade.

Although (they continue) there is no justification for such action now, the addition is absolutely harmless and helps to produce a marmalade which is quite palatable, even though inferior in quality to that made from Seville oranges.

If any manufacturer is sufficiently interested to experiment in this direction, we feel sure that Messrs. Stafford Allen will be only too pleased to give him their assistance.

* * *

Stainless Steel News.

Messrs. Lysaght of Bristol, Newport and Scunthorpe, and Messrs. Hadfields of Sheffield, have entered into an agreement to work together in relation to the manufacture and supply of rustless and stainless steel sheets of all kinds and sizes. These steels will be sold under the trade mark device and the trade name "Cantrust."

Messrs. Hadfields of Sheffield will make the special steel and Messrs. Lysaght will work this into the finished sheets, forms, and shapes, and sell the products.

This arrangement should certainly combine the excellent facilities offered by each of these firms to the best possible advantage.

* * *

Baker Perkins, Ltd.

The staff of Baker Perkins, Ltd., who voluntarily surrendered 10 per cent. of their salaries a year ago owing to trade depression, have now been repaid the whole of the cuts in a lump sum by the firm, who have experienced much better trade than was anticipated at the beginning of last year.

The same firm, incidentally, have just issued a rather diverting piece of publicity matter in the shape of a booklet entitled *Something had to be Done*. The story contained in the booklet tells of what befell a certain firm who, in time of crisis, decided with commendable boldness to scrap their old plant and install new. Copies of this booklet may be had on application to Messrs. Baker Perkins, Ltd.

Mention of the British Industries Fair will be found on page 101. The number of entries this year constitutes a record, and the amount of advance publicity matter sent out has been so voluminous that a detailed description of the exhibits is quite out of the question. The fair must be seen to be appreciated.

FOOD MANUFACTURE, as announced last month, is exhibiting at the Birmingham section, in conjunction with its associated papers, *The Manufacturing Chemist* and *Paint Manufacture*, and visitors to the stand will be made heartily welcome.

* * *

A Modern Trade Centre.

A very interesting item of news for industrialists is the announcement that British Industries House at Marble Arch, originally erected for Gamages (West End) Store, is to become a trade centre for the exposition and marketing of British goods.

The financial control of British Industries House has been acquired by the London Life Association, Ltd., while the enterprise itself has already met with support from a large number of manufacturers, trade federations, Dominion and Colonial Governments, etc., who have intimated their intention of participating in the project.

Leading industrialists have expressed their approval of the enterprise, which, it is realised, will assist the British manufacturer to open up new avenues for business expansion and continuous publicity, and will afford an inexpensive means of securing sound central representation.

Buyers from overseas, the Continent, the Dominions, and the Colonies, when they arrive in London, will find a trade centre from which they can carry out their business expeditiously. Continental buyers, it is stated, will be kept fully informed of what the British manufacturer has to offer; advice on patents and inventions, market research, export markets, sales administration, and publicity will be provided. The opportunity for developing export trade, in particular, is an attractive feature of the scheme. A monthly magazine is to be circulated to official and trade organisations and to buyers throughout the world.

Furthermore, two floors of the building will be occupied by a Merchants' Club, which has been designed to enable the retailer at home and the overseas buyer to conduct their business with a minimum of effort. Foreign buyers will, on arrival in this country, be made honorary members of the club. Interpreters and typists will be supplied. In addition to its business aspect, it is intended to offer all the social amenities of an up-to-date club, with reading-rooms, restaurant, etc.

The building itself has a floor space of 5⅛ acres, with modern equipment throughout, including a battery of twenty lifts, cold storage facilities, and an imposing window display in Oxford Street. The interior design will be a series of showrooms and showcases in arcades, with excellent facilities for exhibiting goods for the benefit of trade buyers. It is estimated that there will be accommodation for five to six hundred manufacturers.

Further information may be had on application to the organisers.

* * *

Dairy Supplies.

A comprehensive list of present-day necessities for the dairy trade has been received from the Dairy Outfit Co., Ltd. The range of articles advertised in the list includes, for instance, delivery churns, measuring pails, bottle boxes, cap seals, and butter blocks. Ice-cream containers are also supplied; as well as many small accessories, such as brushes, which are likely to be of use in the processing of dairy products.

* * *

N.Z. Packing Regulations.

The following information has been issued by the High Commissioner for New Zealand in London, for the guidance of exporters:

(1) Under the Regulations goods exported to New Zealand from any part of the continent of Europe will be prohibited importation if packed in hay, straw, or chaff.

(2) Goods of any origin packed in Great Britain or Ireland may be packed in hay, straw, or chaff, but only if the

packing material is disinfected prior to use in Great Britain or Ireland, in a manner already approved, on behalf of the New Zealand Government, by the High Commissioner.

(3) All invoices for goods packed in materials other than disinfected hay, straw, or chaff must bear a declaration stating the nature of the packing material used—such declaration to be on the face of the invoice and to be signed on behalf of the manufacturers or suppliers by the individual authorised to make the declaration required for Customs purposes. The declaration should be in the following terms:

> "I hereby certify that the material(s) used as packing for the goods on this invoice is (are) . . ."

(4) In the case of goods for which no packing at all is used, or in the case of goods for which no packing apart from the usual export case or bale, waterproof paper or zinc lining, and ordinary internal containers such as cardboard boxes are used, the invoices should bear a declaration in the following terms:

> "No packing material of any kind is used for the goods on this invoice."

(Export cases, waterproof paper, or zinc lining are not regarded as "packing" for the purposes of the Regulations.)

(5) All invoices for goods packed in disinfected hay, straw, or chaff must bear a declaration on the face in the following terms:

> "I hereby certify that the hay, straw, or chaff used as packing material for the goods on this ininvoice has been disinfected prior to use in a manner approved by the New Zealand Government, and further, that all due precaution was taken to ensure that the packing material so disinfected was not rendered liable to contamination anew between the time of disinfection and packing."

This declaration should be made and signed by the individual referred to in paragraph (3) above, and must be countersigned correct by the Medical Officer of Health, or other official specially appointed by the High Commissioner for the purpose.

Manufacturers and exporters in Great Britain and Ireland desirous of using disinfected packing material must apply beforehand for details as to procedure to the High Commissioner for New Zealand, New Zealand Government Offices, 415, Strand, London, W.C. 2.

* * *

A New Type of Steam Pan.

While science and the metallurgist have given us new and improved metals for use in industry, many problems have been created for the designer and the manufacturer in their fabrication and application. These problems apply especially to stainless steel, nickel, and monel metal, when these are used in steam pressure vessels for food manufacture and similar preparations where absolute cleanliness is demanded. In such cases welding of the fabricated parts, with proper treatment of the weld, is almost absolutely essential, and this class of work calls for highly skilled and specialised workmanship.

Unfortunately, in the past, the relatively high cost of vessels in stainless steel, nickel, and monel metal, as compared with tinned iron, copper, aluminium, and the like, has detracted from their use, and their low rate of heat transfer has also been much against them when applied to heating and cooking vessels.

Especially worthy of note, therefore, is the new design of steam pan which has recently been patented and is now being manufactured by the Aluminium Plant and Vessel Co., Ltd. As will be seen from the illustration, the usual form of expensive jacket has been entirely eliminated and a central heater substituted. In this manner the whole pan is considerably cheapened, heating can be accomplished with a stainless steel, nickel, or monel metal heater as quickly as with copper, despite the lower heat transfer of the materials, and the loss of steam at the glands and cost of packing where tilting pans are used is entirely eliminated.

Readers interested in this new type of steam pan should apply for a copy of the recently issued descriptive booklet to the Aluminium Plant and Vessel Co., Ltd.

* * *

A Note on Liquorice.

One of the first necessities of advertising in any form being to stimulate the imagination, the MacAndrews and Forbes Company, of New York City and New Jersey (London address: Bush House, Aldwych), are to be congratulated upon the production of a very successful booklet on *Liquorice*.

Most people seem to believe that liquorice is chiefly obtained from Spain, but that this is by no means the case should be apparent from a few glances at the booklet in question. America has been well to the fore in investigating the commercial possibilities of the herb, and now its uses are so diverse that they include fibre board and fire extinguisher production, as well as the already well-known pharmaceutical and confectionery uses.

Liquorice as a sweetmeat has, of course, retained its popularity through many centuries. The ancients knew it; Egyptian and Chinese sages recommended it; Chaucer wrote about its applicability as a sort of primitive chewing-gum:

> "But first he cheweth greyn and licorys
> To smellen sweete."

Nowadays its uses in confectionery are considerable, but it is suggested that, owing to improved methods of production, these could with advantage be extended.

* * *

Gloucester Firm's Progress.

Speaking at the recent annual dinner of Messrs. Wm. Gardner and Sons (Gloucester), Ltd., the managing director, Mr. Frank Gardner, said that despite unfavourable conditions the works had been kept going on full time and the staff had been slightly increased. This was due to the fine work carried out by the sales staff, not only in this country, but abroad and in the Colonies, and to the loyalty shown throughout the office and works.

The policy of the directors was to give a really sound job at as economical a price as possible. That, in the past, had more than justified itself, not only by the number of new customers which they had obtained, but also the great number of repeat orders.

Proceeding Mr. Gardner expressed the gratitude the firm felt to Mr. Hill, whose firm, Leonard Hill Advertising, Ltd., put in a great deal of work on their behalf in the course of the year.

* * *

Galvanising *v.* Rust.

The world to-day depends so largely upon iron and steel for its existence that the problem of the prevention of rust is one of universal importance.

A booklet that merits the attention of manufacturers interested in the prevention of this form of corrosion has just been issued, under the title given above, by Messrs. G. A. Harvey and Co. (London), Ltd., from whom copies may be had on application.

INFORMATION and ADVICE

CELERY SOUP—DATES—TOMATO CATSUP—SO_2 IN PEACHES—SHIP BISCUITS—LEMONADE POWDER—SAUCE MAKING—SHRIMP PEELING—CARBOXIDE—LEMON CURD—PECTIN—SALAD DRESSING FLAVOUR—SALAD CREAM—TARTARIC ACID

Celery Soup.

1,124. *We shall be glad to have any information you can give us relating to the manufacture of celery soup and celery salt.* (London.)

One might use a mixture of equal quantities (by volume) of pulped celery, milk, and stock, together with corn starch, butter, salt, white pepper, and onion juice to give the desired consistency and flavour. Place the milk in the pan and bring to the boil. Melt the butter and mix intimately with the corn starch (or flour) and add to the milk, stirring continuously until it thickens. Then add the stock, celery pulp, salt, and pepper. Bring to the boil, fill into cans, seam, and process. Milk may be omitted and stock substituted, and the amount of thickening increased.

In making cream of celery soup, beef dripping and beef stock are sometimes incorporated into the mixing, and ground ginger may be an additional flavouring material. In this case the celery sticks would be used after washing in salt water, trimming off the waste, boiling until tender, and passing through the pulping machine.

Celery salt may be made from table salt and dry, ground celery seeds. Care should be taken that the mixture is packed in a perfectly dry condition.

1,125. *Will you please give a recipe for making lemon curd?* (Birmingham.)

Reference should be made to the May, 1931, and February, 1932, issues of this journal.

1,126. *Can you furnish us with a copy of your journal which gives particulars of the preparation of lobster paste?* (Lancs.)

The reference mentioned is to the article published in the November, 1932, issue.

1,127. *I have received an enquiry for the names of manufacturers of machines and accessories required for the manufacture of tomato paste, and should be much obliged if it is possible for you to give me the names of any makers of such plant.* (London.)

These were supplied.

Dates.

1,128. *We would like to know something about the washing, drying, and stoning of dates.* (London.)

The washing and drying operations do not appear to be difficult or to call for any special design of plant. Much depends on questions of cost and output. Any competent engineer could design and build plant to meet with your particular requirements. Agitating or revolving screens or launders would serve the purpose. In the case of drying, the only satisfactory way is to provide full details of your circumstances which would enable an engineer to work out the most suitable form of dryer, of which there are innumerable types.

Stoning dates by machine is a more difficult problem, and we have no knowledge of any appliance having been built for the purpose. Cherry and raisin stoners are, of course, well known, but we should imagine that a date stoner is a more difficult proposition.

1,129. *A copy of* FOOD MANUFACTURE *reached us via Denmark. We were interested in the fine display of advertisements and thought it was a curious thing that a British journal should be sent to us from a Danish source.*

We are interested in (1) *Butchers' machinery and utensils;* (2) *bakers' machinery and utensils;* (3) *refrigeration machinery, insulations, cork, etc.;* (4) *cutlery, needles, etc., we get from Sheffield.*

We should be glad to receive catalogues on the above from your advertisers. We would esteem a recipe for making ordinary mixed meat sausages and a binder (meal used in sausages).

We are also interested in sausage casings white, newspaper, and greaseproof. (Australia.)

We requested a number of firms to forward their catalogues to the enquirer.

An experimental mixing for sausages was furnished.

Tomato Catsup.

1,130. *We should be glad to have particulars of the preparation of tomato catsup made from tomato purée.* (Norway.)

There is not space here to go into this subject. We have an article on tomato catsup manufacture which will be published at the first opportunity, probably in the May issue. To give an isolated recipe is not much use, but as a basis for conducting your own trials you might simmer for thirty minutes a batch of 25 gallons of tomato purée with 4 lb. of chopped onions and garlic (about ½ lb. of the latter) and ½ lb. gum tragacanth (which has been placed in water and stood overnight). The amount of vinegar required would be about a gallon, together with 7½ lb. salt and 17½ lb. white sugar. The flavouring might be made up of ground cinnamon, allspice, mace, white pepper, and ginger, amounting to a total of about 1¼ lb. and in individual quantities to suit the particular flavour desired.

1,131. *Please can you inform us as to the names of the manufacturers of the 1-lb. and 2-lb. size jam jar covers, sample enclosed?* (Sunderland.)

Suggestions were made.

1,132. *Kindly give us the names of the firms able to supply boiling pans suitable for pickle manufacture in which an outside source of steam is not necessary.* (Kent.)

Names were furnished.

1,133. *Please supply the name of the manufacturers of the combustor sugar boiler mentioned on page 76 of the "Food Industries Manual."* (London.)

This was supplied.

SO_2 in Peaches.

1,134. *I hereby ask you kindly to reply to the following enquiries:*

1. *Can you please inform me if it is possible to get rid of the SO_2 added to dried Californian peaches, so that these peaches may be canned in lacquered tins?*

2. *Can this SO_2 be washed out in any way, and if this is the case, how can it be done?*

3. *If this is possible, is there any essence of peaches which can be added to restore the flavour, etc.?*

4. *If there is not any essence of peaches, can you mention any other essence which should be tried?* (Norway.)

We have had no actual experience in the removal of SO_2 from dried peaches. It may be that a certain percentage of SO_2 may be removed by simple washing, but we rather sus-

pect that as SO_2 is allowed in dried fruit offered for sale in this country up to 2,000 parts per million, its removal by washing is not a simple matter. Possibly the SO_2 present is combined with the sugars and other aldehydes natural to the fruit, and for this reason is difficult to remove. We would suggest that experiments be carried out in washing with weak oxidising agents.

Recommendations were made as to the source from which concentrated peach essence may be obtained.

1,135. *Kindly put us in touch with any firm, or firms, who make machines for fastening bottoms and flaps, filling and fastening top flaps, of 4-oz. powder cartons.*

We wish to point out that as we have only just started packing this commodity we need only a small and inexpensive machine. (Bath.)

Likely sources of supply were indicated.

1,136. *We shall be much obliged if you will give us the names of makers of machinery for wrapping and cartoning of dried fruit, such as sultanas, currants, and raisins.* (London.)

Names were given.

1,137. *We are very anxious to obtain a book, or publication of some kind, dealing fully with the art and practice of butter blending. We should be very much obliged if you could give us the name of the publishers of the above, or of anyone you think might be likely publishers.*

It is possible that you have at some time published an article on this subject, and if so we should be very glad to have a copy of it. (South Wales.)

We very much regret that we are unable to recommend a book on butter blending.

We have been in touch with the National Institute for Research in Dairying, and their librarian informs us that they do not know of any book on the subject. It would appear, therefore, that no book is published.

We have never had an article on the subject in our journal as it is slightly outside our field.

In any case, butter blending would appear to be more of an art than a science, depending largely on the individual taste of the blender and local market requirements.

Ship Biscuits.

1,138. *We would welcome any information you can furnish with regard to the manufacture of ship biscuits.* (Manchester.)

The following recipe may be of assistance to you:

Flour	280 lb.
Salt	2½ lb.
Water	12½ gal.

This will produce a light dough which must be put through the brake until quite clean, being allowed to recover during the operation from the toughening action. After mixing it should rest for an hour, and after braking it should rest for a further hour.

The biscuits should be about ¼ inch thick before being baked, and they should be cut and docked in one operation if done by machinery. The hand-made biscuit eats better than the machine-made one.

If the biscuits are to be shipped abroad, they should be kept in a warm room for about a fortnight after they have been made, so as to ensure a perfect drying-out, otherwise there is danger of mould setting in. This mixing will give about 270 lb. of finished biscuit.

1,139. *I am preparing a paper to be read before one of the engineering institutions on "Automatic Weighing and Packing," and would be glad if you would let me have the names of firms who specialise in these machines.*

The subject will embrace the weighing of solids, liquids, and gases by mechanical and electrical means.

I wish to bring out the modern advances in the subject, so that producers will have before them the best and most up-to-date information.

I would also be glad if you could lend me any articles or papers on the subject. (Westminster.)

Information supplied.

1,140. *Would you please let us know to whom we should send an order to patent names for various food products, and if we could get particulars as to the conditions and the patenting from them?* (Gloucester.)

The enquirer was put in touch with patent agents.

Lemonade Powder.

1,141. *Kindly supply formula for an effervescent lemonade powder.* (London.)

The effervescent ingredients are sodium bicarbonate and one or more of the following acid substances: citric acid, tartaric acid, cream of tartar, sodium pyrophosphate, acid calcium phosphate. Citric and tartaric acids act rapidly on the sodium bicarbonate, but the mixture deteriorates readily. Acid calcium phosphate and cream of tartar are less vigorous and produce a slower effervescence, but they store much better when made up. Sodium pyrophosphate is less active still, but keeps almost indefinitely in mixtures. Acid calcium phosphate is apt to produce cloudiness.

It is usual to make up a mixture containing at least two acid ingredients, such as: Tartaric acid, 1 part; cream of tartar, 1 part; sodium bicarbonate, 2 parts; or tartaric acid, 25 parts; citric acid, 20 parts; sodium bicarbonate, 50 parts. Care should be taken to see that the ingredients, before mixing, are in a perfectly dry condition, and that the mixing and subsequent storage are kept dry also.

A typical recipe for an effervescent lemonade powder is as follows:

Sugar	56 lb.
Citric or tartaric acid	2½ lb.
Terpeneless lemon oil	3 drams.
Effervescent mixture	6 oz.
Colour as required.	

1,142. *Could you kindly let us have the names and addresses of firms who make wood pulp caps with metal outer bands for jam jars?* (Leeds.)

Names and addresses supplied.

1,143. *We note with interest the following queries under "Information and Advice" in the January issue of* FOOD MANUFACTURE, *and shall be obliged if you will furnish us with the names and addresses of the parties interested:*

1,024. *"Evaporated Milk," London.*
1,027. *"Pectin," Argentina.*
1,038. *"Vacuum Sealing," Wolverhampton.*
1,043. *"Rice Milling Machines," Liverpool.*

Names and addresses forwarded.

Sauce Making.

1,144. *I should be obliged if you could give me recipes for making sauces similar to H.P.* (Lancs.)

We have, of course, no recipe for a sauce which would match H.P., and even if we had, it would not leave our hands. The only way, as we have pointed out previously on more than one occasion, is to investigate and try the thing out oneself, or to secure the services of an expert, if it is a question of matching a particular article.

We would refer the enquirer to an article on sauce manufacture published in the present issue.

1,145. *Kindly put us in touch with a supplier of tinned sheets and lead-tinned sheets of a thickness of $\frac{15}{100}$ millimetre.* (France.)

This was done.

1,146. *Please supply information on the subject of poultry canning.* (Yorks.)

See this journal for December, 1931, February, 1932, and February, 1933.

1,147. *Could you help me with the procedure and quantities used in the manufacture of reconstituted cream built up from milk and butter?* (Nottingham.)

The enquirer was put in touch with firms supplying a suitable emulsifying machine, who were also able to supply him with the information and manufacturing details required.

Shrimp Peeling.

1,148. *We wish to find a machine for skinning or peeling shrimps preparatory to potting.* (England.)

We do not know of any such machine. We understand that in American practice the heads and shells of shrimps are removed for canning by what is known as the "peeling" process. The head and the thorax break from the heavy tail with ease, and a slight squeeze will separate the shell from the fleshy portion. The meats are then thoroughly washed in two or more changes of water and are then ready for blanching, which is done by boiling in brine.

Carboxide.

1,149. *In the "Food Industries Manual," Section I., page 38, mention is made of a fumigation process by heavier-than-air gases. You state there that a mixture of ethylene oxide and liquid carbon dioxide is marketed under the trade name "Carboxide."*

Can you say whether this is procurable in this country, and, if so, the name of the firm? (Glasgow.)

"Carboxide" is an American name for a mixture of ethylene oxide and carbon dioxide. The enquirer was put in touch with sources of supply here.

1,150. *We should be much obliged if you would be good enough to give us the names of makers of separators used for packing eggs.*

These are made of some kind of paper pulp, shaped to the lower end of the egg. (Glasgow.)

The name and address of a firm specialising in such egg separators were forwarded.

1,151. *If you could put us in touch with the manufacturers of "Mikah" adhesives we should be very much obliged.* (London.)

This was done.

Lemon Curd.

1,152. *We should be obliged if you could give us the name of a manufacturer of paper similar to the enclosed for covering preserves before putting on the tin caps. We presume that this covering would prevent any flavouring from affecting the jams.*

We should also like to know if there is any small machine on the market for (a) *grating peel off lemons for lemon curd, and* (b) *squeezing juice from lemons and oranges, etc.*

We seem to have got mould in our manufactory, and we should be glad to know if there is any means of avoiding it, by disinfecting, for instance. (England.)

The enquirer was referred to suitable firms for paper covers and the machines mentioned.

As regards the question of mould, the only way of combating this is to take every precaution in keeping all vessels, jars, and equipment used, as well as the place in which the product is made, absolutely clean, frequently washing out vessels, etc., with hot water, preferably in which a detergent has been dissolved, and rinsing out with sodium hypochlorite solution as a disinfectant, and finally with hot water. It is only by exercising every possible care and cleanliness in seeing that the jars in which the product is packed are perfectly sterile that one can eliminate the danger of mould; the same applying, of course, to equipment and storage places. The enquirer should refer to previous remarks we have made on this subject.

1,153. *With reference to Enquiry No. 1,030 in the January issue of* FOOD MANUFACTURE, *for particulars of manufacturers of collapsible tubes, we shall be obliged if you will kindly furnish us with this information also, for which service we thank you in advance.* (Liverpool.)

Names of the manufacturers were forwarded.

1,154. *We have a client in South Africa asking for a raisin seeder. The capacity of the machine need not be great as our friend is only a retailer, but he wants a really good machine that can be relied upon.*

Any instructions with regard to the seeding of the raisins in connection with the machine would be appreciated.

If you can put us in touch with any likely sources of supply for this machine we shall be greatly obliged. (London.)

A source of supply was indicated.

Pectin.

1,155. *One of our clients has asked us if we can give him any information regarding the use of pectin in orange marmalade.*

Should you be able to give us any details, we shall be very pleased to forward your letter. (London.)

Formulæ were supplied. At the same time the enquirer was referred to an article on the subject published in November, 1932.

1,156. *We would appreciate being put in touch with firms able to supply plant for the manufacture of quick-cooking oats.* (Holland.)

Suggestions were made.

Salad Dressing Flavour.

1,157. *Please give us any information you can on the flavouring of salad dressing and stability of the emulsion.* (Lancs.)

This will be dealt with in a future article.

There is a wide variety of flavouring. We have one recipe which calls for Worcester sauce and mustard, while another entails the addition of 1 oz. to each 50 gal. of dressing the following mixture: 6 oz. oil of cloves, 3 oz. oil of pimento, and 2 drams of oil of cassia.

Salad Cream.

1,158. *Could you kindly furnish me with recipes for making salad cream?* (Yorks.)

An example was furnished. The whole subject of mayonnaise, salad dressing, and salad cream will, however, be dealt with in a future article.

1,159. *We shall be glad if you will give us a comprehensive list of literature (books, reports, and articles) dealing with food values, fats, carbohydrates, etc., and vitamins. In particular we should be glad of the title of Miss Browning's work referred to on page 2 of the January issue, and also where a copy of Professor Drummond's chart and lecture can be obtained.* (Birmingham.)

A list of publications was forwarded. The title of Miss Browning's work is *The Vitamins*, price 42s.

1,160. *Can you please inform me whether there is in existence a body entitled the Food Manufacturers' Federation? If there is, will you please let me know the address?* (Scotland.)

The address was given.

Tartaric Acid.

1,161. *I should be very thankful to you to let me know which are the manufactures for which tartaric acid and cream of tartar are chiefly used in this country.*

I am given to understand that cream of tartar is superseded by substitutes in the making of baking powder, for instance, and I should like to have some information on the matter. (France.)

The following are the uses of tartaric acid and cream of tartar:

Cream of Tartar (Potassium Bitartrate).—Medicinal preparations; tinning of metals; baking powders.

Tartaric Acid.—Baking powder; certain classes of biscuit manufacture; aerated beverages—although citric acid is more commonly used; some non-alcoholic beers—such as ginger beer; various other beverages—*e.g.*, health salts; lemonade powders and other powders for producing effervescent drinks; preparation of tartrates; tanning; textiles; photography.

You will realise that much depends on the question of cost as to what particular acid ingredient is used along with the bicarbonate of soda. A number of relatively cheap acid salts have been suggested and are used in place of cream of tartar, although some of these are inferior.

Tartaric acid differs in its action from cream of tartar in that it acts much more quickly; in fact, tartaric acid is far too rapid in its action for ordinary purposes, and for this reason is frequently mixed with cream of tartar. As regards acid salts commonly used in baking powders, reference should be made to the *Food Industries Manual* and to Bennion and Stewart's *Cake Making*.

1,162. *Could you please give me some information concerning publications on the subject of cooked meats, as supplied to enquirer No.* 1,050? (Scotland.)

Suitable publications were recommended.

1,163. *We are interested in sponge mixtures, and would be much indebted if you would give us the general formula and process of manufacture.* (Durham.)

Information was supplied.

A Quota for Oats

ONE section of agriculture having been given protection and financial support in the shape of the Wheat Act, it is not surprising to find that farmers who do not grow wheat are now pressing for a similar assistance in regard to their own products. The farmers of Aberdeenshire, where one would naturally expect them to have an eye on the main chance, are pressing for the introduction of a quota scheme for home-grown oats on the lines of the Wheat Act, or for some other measure that will afford them more substantial protection than that which they have at present—*i.e.*, a 10 per cent. *ad valorem* duty on foreign oats. One suggestion is a levy on imported oats to be paid to an Oats Commission which would use the fund so subscribed to make up a guaranteed price to growers, in the same manner as the Wheat Commission makes its deficiency payments to wheat growers. Thus the pernicious system spreads. The Government, by giving assistance to wheat growers, have invited demands for help from growers of other produce. If the system is not stopped every branch of agriculture will be on a fictitious basis with artificial standards. No doubt a guaranteed high price for oats would suit the farmers of North-East Scotland, where wheat cannot be grown, but what would other stock farmers in different parts of the country say to a levy on imported oats which form such a substantial part of their feeding stuffs?

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

EXSPAN.—526,602. **Substances used as food or as ingredients in food.** WEBER, LTD., 268, 347, and 348, Central Markets, London, E.C. 1. February 24. (By Consent.)

TUDOR ROSE.—528,190. **Cakes and biscuits.** ALFRED DOUGLAS GORDON COURAGE, trading as the Surrey Biscuit Company, Radnor Road, Weybridge, Surrey. February 24.

MELLOWDALE.—528,727. **Butter.** E. M. DENNY AND CO., LTD., Hilbernia Chambers, London Bridge, London, S.E. 1. February 24. (Associated.)

CORONA.—528,610. **Tea and coffee.** TREVOR PRICE, Aycote House, Rendcomb, near Cirencester, Gloucestershire. February 10.

BATGER'S THREE STAR.—527,236. **Sweetmeats, but not including chocolate assortments.** BATGER AND CO., LTD., 102, Brook Street, Ratcliff, London, E. 1. February 10. (Associated.)

LADOMA.—529,082. **Cakes and biscuits.** NEWBALL AND MASON LTD., 90, Beech Avenue, Nottingham. February 24.

DIKVALE.—529,036. **Substances used as food or as ingredients in food.** GEORGE WILLIAM KING, trading as George King and Sons, 29, Castle Gate, Nottingham. February 24.

BRISKIES.—528,989. **Prepared foods made from wheat and milk.** THE THAMES MILLING CO., LTD., 15, St. James's Place, London, S.W. 1. February 24. (Associated.)

FANTASY.—528,778. **Baking powder.** The firm trading as JAMES MILLER, Park Place, Cheetham, Manchester. February 24.

TARTAN.—518,375. **Smoked salmon.** STRUAN, RITCHIE, LTD., 80, Lower Thames Street, London, E.C. 3. February 17. (By Consent.)

HONEY JOY.—526,990. **Fruit cordials (not alcoholic, not aerated, and not medicated).** HOOD'S DAIRY PRODUCTS, LTD., 86, Cadogan Street, Glasgow, C. 2. February 17. (By Consent.)

SUMMIT.—526,776. **Tea and coffee.** RANDAL WOOLLATT AND CO., LTD., Ranwolla House, Pratt Street, London, N.W. 1. February 17. (Associated.)

SUPERBRA.—527,334. **Food for poultry, and eggs and poultry (for food).** SCIENTIFIC POULTRY BREEDERS' ASSOCIATION, LTD., Church Street, Rudgwick, Horsham, Sussex. February 17.

WINMARA.—527,482. **Poultry (for food) and eggs.** FREDERICK FRASER, trading as the Winmara Grade A Poultry Farm, Poulton Road East, Poulton-le-Fylde, Lancashire. February 17. (By Consent.)

MAJESTIC.—527,551. **Chocolate.** W. S. SHUTTLEWORTH AND CO., LTD., 16, Galleywall Road, South Bermondsey, London, S.E. 16. February 17.

TESCO.—527,776. **All goods in Class 42, which includes substances used as food, but not including tea or edible fats, and not including any goods of a like kind to any of these excluded goods.** JOHN EDWARD COHEN, 38 and 40, Upper Clapton Road, London, E. 5. February 17. (By Consent.)

YEATOX.—528,507. **Brewing sugar.** GONVILLE, JARVIS AND CO., LTD., 63, The Broadway, Stratford, London, E. 15. February 17. (By Consent.)

CONSHAW.—528,627. **Fruit and vegetables (for food).** CONNOLLY SHAW, LTD., London Fruit Exchange, Spitalfields, London, E. 1. February 17.

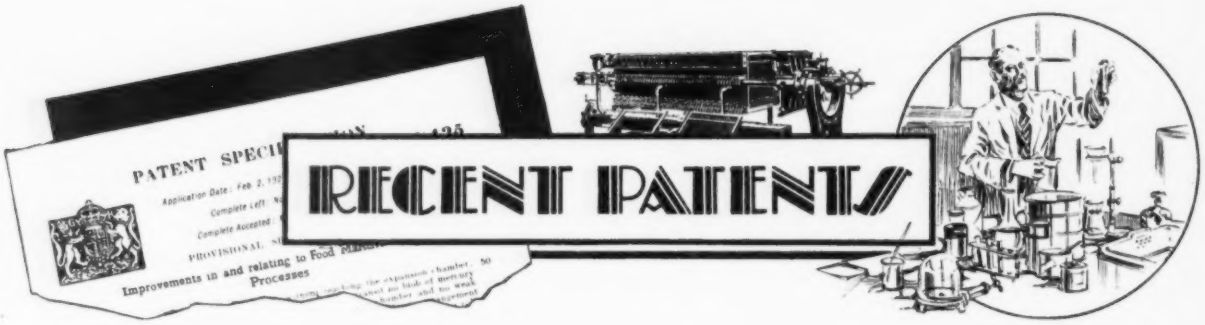
OBBO.—528,742. **Flour.** JOSEPH RANK, LTD., 27, Leadenhall Street, London, E.C. 3. February 17.

GIP.—526,534. **Bacon, hams, butter, cheese, lard (for food), eggs, margarine, and rabbits (for food).** I. BEER AND SONS, LTD., 15, King Street, West Smithfield, London, E.C. 1. February 10. (By Consent.)

FIVE CROWNS.—526,569. **Flour.** JOHN AIZLEWOOD, LTD., Crown Flour Mills, Nursery Street, Sheffield. February 10. (Associated.)

HI-NOON.—527,409. **Tea.** JACKSON AND HOWARD, LTD., 41, Great Tower Street, London, E.C. 3. February 10. (By Consent.)

MUNDAH.—529,135. **Tea.** ARTHUR WELLS HADINGHAM, 58, Haymarket, London, S.W. 1. February 24.



These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents, and are published by permission of the Controller of H.M. Stationery Office, and the Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

2875. INDUSTRIKEMISKA AKTIEBOLAGET: Manufacture of yeast. Jan. 30.

2039. BACK, R. G.: Canning. Jan. 21.

1883. HESSER MASCHINENFABRIK AKT.-GES., F.: Plant for packing edible fat, etc. Jan. 20.

1794. MEGNANT, C. G.: Clarifying juice of sugar cane. Jan. 19.

1601. MILLINGTON, C. F., and THOMPSON, H. W.: Device for cutting rind off sliced bacon. Jan. 18.

Specifications Published

387,053. BOSURGI, DR. G.: Productions of jams or jellies.

387,165. AESCHBACH AKT.-GES., F.: Cutting-machines, particularly for foodstuffs.

386,167. TRES CHEMISCH-PHARMAZEUTISCH INDUSTRIE UND HANDELS AKT.-GES.: Manufacture of foodstuffs rich in proteins.

386,178. SCHLUMBOHM, DR. P.: Vacuum process for the dehydration of substances sensitive to temperature, in particular for the manufacture of foodstuffs, feeding stuffs, and medicines.

386,276. SOC. INDUSTRIELLE ET AGRICOLE DE LA SOMME: Treatment of sugar juices.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts Published

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

383,472. **Flavouring materials for food.** HOWARD AND SONS, LIMITED, Uphall Works, Ilford, Essex.

The Specification as open to inspection under Sect. 91 (3) (*a*) states that flavouring essences have incorporated therein as a fixative during the preparation a small proportion, which may be 5 to 15 per cent., of ortho-cyclohexyl-cyclohexanol or a homologue—*e.g.*, a methylcyclohexyl-methylcyclohexanol or a derivative thereof. In examples the fixative is added to essential oils such as lemon and orange oils. The subject-matter does not appear in the Specification as accepted.

383,661. **Preserving foodstuffs, etc., against rancidity.** COE, M. R., 2947, Mill Avenue, Northeast, Washington, U.S.A.

Human and animal foodstuffs—*e.g.*, butter, potato chips, or cattle feeds—and other commodities containing oils, fats, and waxes and subject to rancidity, are preserved by exclusion or absorption of all light except that having wavelengths lying between 4,900 and 5,600 Angstrom units. The commodity may be enclosed in a green protective screen—*e.g.*, by wrapping a green transparent paper, etc.—or chemical means may be added to the commodity, capable of absorbing and excluding all the unwanted rays—*e.g.*, an appropriate dye may be mixed with the commodity or a coating of chemicals having the required colour may be applied by painting on, dipping, etc. The protective materials assist in maintaining the natural colour of the commodity. Specification 213,810, Class 94 (*i*), Packing, etc., is referred to.

382,157. **Fruit Jelly.** BOYLES, F. M., South 4th Street, Brooklyn, New York, U.S.A.

A product from which a jelly can be obtained on addition of a sugar syrup is prepared by adding to a pectous concentrate having a mineral content of base forming salts, a minute quantity—*e.g.*, 1/100 per cent. by volume—of hydrochloric or other mineral acid to convert the salts into non-hydrolizable compounds. An organic acid, such as citric, tartaric, acetic, lactic, or malic acid, and a flavouring material, such as fruit juice concentrated at a low temperature or essential oils, are also added to the pectous concentrate. The jelly may be prepared without using heat.

New Companies

BRITISH FISH CANNERS, LIMITED. (271821.) To take over the bus. of canners of fish, etc., cd. on in Leeds and elsewhere by the Norseland Canning Co., Ltd. Nom. Cap.: £7,500 in £1 shares.

TEEKOFF, LIMITED. (271938.) 1, Ewell Road, Cheam. To carry on the bus. of dlrs. in tea, coffee, groceries, etc. Nom. Cap.: £1,000 in £1 shares.

FELIX FORD AND SONS (1933), LIMITED. To take over the bus. of wholesale fruit mchts. cd. on at Maylord St., Hereford, as Felix Ford and Sons. Nom. Cap.: £2,500 in £1 shares.

WOOLGROVE, LIMITED. (272019.) To take over the bus. of confectioners cd. on at 2, Heslington Rd., 7, Low Ousegate, and elsewhere in York, as "Woolgrove." Nom. Cap.: £3,000 in £1 shares.

LONDON ICE BISCUIT COMPANY (1933), LIMITED. (272030.) 76-8, Pomeroy Street, S.E. 14. To carry on the bus. of bakers and mnfrs. of and dlrs. in ice biscuits, etc. Nom. Cap.: £5,000 in £1 shares.

W. THOMAS AND COMPANY (DOCKHEAD), LIMITED. (271917.) 4, Dockhead, Bermondsey, S.E. To take over the bus. of spice millers and ginger bleachers, etc., cd. on at Dockhead, S.E., as "W. Thomas and Co." Nom. Cap.: £6,000 in £1 shares.

PREPARED VEGETABLES, LIMITED. (272283.) 94a, College Street, Southampton. To carry on the bus. of preparing, marketing, and retailing fruit, vegetables, etc. Nom. Cap.: £100 in £1 shares.

A. S. DEACON AND COMPANY, LIMITED. (272046.) 257, Albert Road, South Norwood. To carry on the bus. of butchers' sundriesmen, etc. Nom. Cap.: £10,000 in £1 shares.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.